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THE FRESH VEGETABLE INDUSTRY IN ALBERTA

A FEASIBILITY STUDY ON THE EXPANSION OF THE FRESH VEGETABLE INDUSTRY
1967

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A FEASIBILITY STUDY TO DETERMINE THE REQUIREMENTS FOR THE EXPANSION OF THE FRESH VEGETABLE INDUSTRY IN ALBERTA, [1967]

By

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Study Financed By
Provincial and Federal Governments
through A.R.D.A.

Hon. H. E. Strom
Minister

Dr. E. E. Ballantyne
Deputy Minister

Alberta Department of Agriculture

PREFACE

While the fresh vegetable industry in Alberta is small relative to major agricultural enterprises there has always been considerable interest from producers, industry, governments and community organizations in the prospects of further development.

In the past, a number of economic studies have been conducted on various phases of the vegetable industry at the request of growers, and, many government agencies and other research institutions have undertaken experimental work on the growing, harvesting and storing of vegetables.

The objective of this research project is to assimilate all available information, delineate areas requiring further investigation, and carry out research on the technical and economic feasibility of vegetable production and marketing. The research was conducted by K. D. Porter, under the general supervision of B. J. McBain, Head of the Production Economics Research Branch, and with the collaboration of J. Dunn, Alberta Bureau of Statistics, and P. D. Hargrave of the Plant Industry Division.

The main benefits of the studies will be in the provision of guidelines to producers and their associations, processors and trades people and government bodies interested and involved in expansion and further development of the vegetable industry. Expansion that is economically feasible would enable farmers in irrigated and other areas to increase the acreage of higher value crops; increase farm income and create employment opportunities on farms and in processing establishments, increase the possibility of vegetable exports and have a beneficial effect on Canada's balance of trade with U.S.A.

The study was financed on a joint basis by the Provincial and Federal governments under the Agricultural Rehabilitation and Development Act.

Knud Elgaard

KNUD ELGAARD,
Assistant Director.

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INTRODUCTION

The Project - Feasibility Study to determine the requirements for the expansion of the Fresh Vegetable Industry in Alberta.

This report attempts to define the factors influencing the development of the Alberta fresh vegetable industry; to interpret their effect; to examine trends in production techniques and market structure; and, to draw conclusions about the future development of the industry. Arising from these conclusions, a supplementary report to the government will be made on its possible areas of concern.

The need for a study developed from conversations and discussions among Vegetable Growers, Government and Industry over a period of years. The common opinion was that the rate of growth of Alberta's Fresh Vegetable Industry could be improved. It appeared that the resources of soil, irrigation facilities, climate and production techniques were not utilized in their full capacity to produce high-return crops. Moreover, the importation of fresh vegetables was retarding natural development of local commercial production.

A committee, consisting of representatives from the Economics Division, Plant Industry Division and the Alberta Bureau of Statistics, drew up a proposal for an economic study of the Alberta Fresh Vegetable Industry. It was approved as A.R.D.A. Project No. 9037 early in 1965, with a suggested duration of 18 months to 2 years.

The study was requested to be carried out under the general direction of Dr. G. R. Purnell of the Economics Division. It was placed under the Research Branch headed by B. J. McBain, with K. D. Porter appointed as Project Leader.

Following authorization of the Project, Dr. Purnell and Mr. Porter held meetings between the Plant Industry Division, Department of Industry and Development, and the Economics Division, and arranged for areas of responsibility in the Project to be handled by Mr. P. D. Hargrave, Mr. Ray Huene, Mr. Clarke Ferries and Mr. Porter. Subsequently, Mr. Huene and Mr. Ferries changed their employment, and Mr. Huene was replaced by Mr. J. Dunn who became the third member of the research group.

Funds were provided to permit a wider scope of investigation than had been possible in prior provincial vegetable studies.

By this means, American areas of production were visited and extensive economic data were secured from University and experiment station sources. Similar information regarding Canadian production and distribution was obtained from business, government and private sources. These data were used to analyze the competitive position of American and Canadian fresh vegetable products in Alberta in their relative horticultural and economic environments.

Since land and water resources suitable for vegetable production are widespread in Alberta, three general areas were considered in the study - Southern Alberta, Central Alberta and Northern Alberta.

The report places special emphasis on the economics of production, distribution and organization as the controlling influences in an expansion of the fresh vegetable industry in Alberta.

Appreciation is expressed for the assistance received from Departments of the Government, both Federal and Provincial; from the University Department of Horticulture; from vegetable growers and shippers; from produce wholesalers; and, from educational institutions and manufacturers in the United States.

Acknowledgement is also due for the contributions of the professional staff of the Production Economics Research Branch and for the assistance given by the clerical staff who contributed much of their time and effort in processing data, and in typing and proof-reading the report preparatory to publication.

THE PURPOSE OF THE STUDY

The purpose of this study is to assess conditions contributing to the present situation of the fresh vegetable industry in Alberta, and to report on the potentialities and possibilities for expansion in the future.

Composite objectives are:

(1) To gather available information on soil, climate, irrigation, planting, harvesting, sorting, grading, packaging and marketing of fresh vegetable products.

(2) After assimilation of the above-mentioned information, determine the areas which require further investigation, and through research, compile the necessary data with particular reference to:

  (a) investment required in storing facilities by the growers, and equipment required by the central facilities.
  (b) anticipated profit on investment.
  (c) type of industry, organization and contractual arrangements required.
  (d) obstacles to the successful development of the industry.
  (e) action required, if any, to establish the industry.

VEGETABLE CROPS CHOSEN FOR STUDY

Handbook Number 158[1] lists 32 kinds of vegetables which are recommended for growth in Alberta. A large number of these are grown commercially.

Fifteen of them were chosen because of commercial and horticultural characteristics to form a basis of study of outlook for the fresh vegetable industry. These vegetables are listed below:

(1) Asparagus
(2) Beets
(3) Cabbage
(4) Carrots
(5) Cauliflower
(6) Celery
(7) Corn(Sweet)
(8) Cucumbers
(9) Lettuce
(10) Onions
(11) Parsnips
(12) Potatoes
(13) Radishes
(14) Tomatoes
(15) Turnips (Rutabagas)

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[1] Pub. No. 158, Alberta Department of Agriculture, Extension Branch.

SUMMARY AND CONCLUSIONS

Natural Resources

The soil, climate, temperature and precipitation conditions in Alberta are suitable for greatly expanded production of commercial vegetable crops. The irrigated areas must be considered as having the greatest potential. A still larger area of non-irrigated land, in the central portion of the province reaching to a point slightly north of Edmonton, can accommodate extensive commercial vegetable undertakings. River valleys in the Peace River areas are adaptable for commercial vegetable production. In all parts of Alberta, a one-crop-per-year production cycle prevails.

Classes of Vegetables

The variety of crops capable of being produced in the province increases in a southerly direction from Edmonton to Taber and Medicine Hat. While most of the vegetables studied in this report may be grown commercially in Alberta, potatoes, carrots, turnips, cabbage and onions were selected as the presently preferred commercial crops; others such as fresh corn, cauliflower, cucumbers, parsnips, lettuce, asparagus and radishes are in a secondary group.

Production Practices

Modern cultural practices are in use in many localities in both the irrigated and non-irrigated districts. Improvement in high capacity machine-use and storage methods has taken place in potato production, but is slower in other vegetable production.

Production Costs and Returns

Alberta growers have relatively low land, water, labor and taxation costs. Calculations of costs show that commercial growers can expect to achieve a satisfactory margin of profit, and can compete with imported produce.

Labor

Labor for field work is scarce. Vegetables are labor - intensive in varying degrees. Labor elsewhere, as in California where cheap labor was the foundation of the vegetable industry, is becoming more expensive and selective.

Industrial vegetable plant labor, however, is usually available if plants are near small population centers, and should not be a problem in Alberta.

It is suggested that both immigrants and foreign nationals be encouraged to enter the farm labor force. If this does not produce the additional labor required, increased investment in production equipment must be contemplated.

The Market

The national chain retail stores have changed the character of the vegetable retail industry from in-season local bulk supply to a year round supply of consumer pack units. Consumers now prefer these items and purchase them regularly. If Alberta growers wish to expand their business, they will have to adapt their production to the demands of the trade.

The projections for the available market for fresh vegetables in the future are based on the proportionate market for which Alberta can compete in the Western Provinces. At present, consumption requirements are being filled by supplies from home gardens, market gardens, large volume vegetable producers, and foreign suppliers. Though the potential market seems large in relation to present local production, Alberta growers will face competition from growers in other locations.

Expanded Markets

The potential market of Alberta fresh vegetables indicates there is room for expansion in the home market as well as those of the neighboring provinces. It may be expected that provincial marketing commissions will be formed over time and interprovincial negotiations will influence the flow of fresh vegetables on the national scene.

Among the fresh vegetables, potato production is satisfying the home market and extending supplies to B.C., Saskatchewan and Manitoba. Additional expansion can occur in these three markets, but as Alberta's production increases, markets further afield should be investigated.

Root-crop vegetables, such as carrots, turnips, beets, parsnips, onions and other vegetables which may be successfully winter-stored by the use of modern temperature and humidity-controlled facilities, appear to have a very favorable outlook for expansion at home and in the neighboring provincial markets.

More perishable vegetables, such as celery, cauliflower, lettuce, cucumbers, radishes, asparagus and fresh corn, have less probability of successful expanded production because they are mostly labor-intensive, have a limited storage life, and must be sold in the flush season. A relatively few large commercial grower-shippers could probably adequately supplement the supplies from the numerous small market gardens in Alberta and Saskatchewan.

Export

The entry of Alberta fresh produce into American markets will require the services of American brokers; and may necessitate association between local shippers and established American businesses in the U.S.A. Canadian produce would have the advantage of an 8% bonus at current exchange rates. It is suggested that prospective shippers seek advice from the Department of Trade and Commerce in respect to reciprocal freight rates to American centers. These rates are not now available.

Centralization

(1) Participants

Potato growers, who are concentrated in one area and are already supplying markets, should consider the advantages of centralized packing and marketing relative to their present and future production capabilities.

Root-crop growers, who are already in production and wish to expand into available markets should, individually or by group action, plan the erection of modern packaging and storing facilities.

Centralization of facilities for preparing vegetables commonly grown for summer sale, may be warranted on a small scale or incorporated as an enterprise subsidiary to other plant output.

(2) Plant Location

The economic feasibility of establishing centralized fresh vegetable packing plants depends not only on the capacity of primary production but also on the rate of development markets.

At present, the erection of such plants should be limited to established producing areas. The Brooks and Edmonton areas could probably justify the erection of a single centralized potato plant in each at the present time in order to accommodate producing areas other than those served by the Vauxhall and Taber plants. A five-year interval should elapse before similar facilities are erected elsewhere.

Centralized storage and packaging units for other fresh vegetables appear to have a good production basis for establishment at Medicine Hat, Taber, Edmonton and Brooks-Rosemary. In the latter case, some arrangement for the interim use of the present plant facilities at the horticultural station might be made. As in the case of the potato plants, there should be a period of consolidation for these businesses before similar centralized plants are erected elsewhere.

(3) Plant Size

It is suggested that initial potato plant capacity be in the 15,000 to 20,000-ton annual output range, and that the initial root-crop plant capacity be in the output range of 600 to 1,000 tons.

(4) Plant Products

Wholesalers customarily order carlots of mixed vegetables. Vegetable plants may conveniently pack three or four similar kinds of veg-tables. Careful planning of plant facilities is recommended prior to integrating other lines of fresh vegetables into potato packing plants.

(5) Storage

Winter storage is one of the problems which has led Alberta growers to consider centralization. Roothouse storage imposes an uncertain storage life on vegetables and limits the output of the individual grower. Certain modifications to potato roothouses can be adequate for potato storage, but other stored vegetables must have temperature and humidity control in order to be marketable in spring months of the year.

It follows that if modern vegetable storage facilities are built, they must include adequate grading and packing equipment.

(6) Investment

Centralized plants, of economic operating size, require capital for construction and operation in larger amounts than is usually available to an individual. A fully equipped potato plant ranges from $200,000 up to $400,000. Expected output is in the neighborhood of 12,000 tons and 25,000 tons, respectively, with plant charges of $12.00 to $18.00 per ton to take care of all financing and operating costs.

A centralized plant of economic size for carrots, beets, turnips, parsnips, etc. requires an investment of $70,000 to $120,000 with the output being 400 to 1,000 tons of packaged and bulk produce. Expected operating costs in the nature of $60.00 to $70.00 per ton of output should cover all financing and operating charges, excluding raw product purchases.

(7) Finance

The object of modern vegetable plant techniques is to provide continuous high quality consumer pack produce to wholesalers and retailers.

It is suggested that such enterprises merit the attention of both private and government agencies which are concerned with providing capital in industrial development. Investment, in soundly based undertakings of this nature in Alberta, would open up a new element in the industry of the province.

Organization

The potato growers of Alberta have recently made an entry as an organization into the marketing field. The fresh vegetable growers are in the early stages of setting up a provincial growers' organization and have not entered the marketing field as an organization.

If centralization of plants is adopted by growers, local and provincial organizations will continue to develop because of (1) the need for co-ordination of production, and (2) the necessity of stabilizing prices.

Imports

Fresh fruit and vegetable imports from the U.S.A. are valuable items of trade. Vegetable imports from that country accumulate additional costs besides those of production before they enter Alberta. These are freight, refrigeration, tariff and Canadian exchange. Canadian tariffs may be either Specific Duties alone, or in conjunction with the Ad Valorem Duty. Regulations against dumping are relevant to international trade and are being revised by a committee formed during the Kennedy Round at Geneva. Grower organizations should be aware of this.

The greatest number of yearly fresh vegetable unloads in Alberta - excluding potatoes - consists of imported produce. These vegetables are transported from places such as California, Texas, Florida, Arizona, Ontario and British Columbia. Refrigerated transport and negotiated freight rates have made this possible. Most of the produce is crated or prepacked and, therefore, is of higher value than bulk shipments per dollar of freight cost. Much of this produce is imported on the basis of its being out-of-season in Alberta but it can be seen in Alberta retail stores in all seasons of the year.

Transportation

Most rail rates on shipments of Alberta vegetables are mileage rates. In order to encourage traffic in vegetables, representatives of the industry should negotiate with railways and trucking firms to secure the cheaper Commodity and Incentive rates. The major centers of population are the largest markets. Therefore, considerable effort is justified in getting the lowest possible transportation rates to these points. California produce is transported across the continent. It is conceivable that Alberta winter-stored produce may participate, in the future, in similar distant markets.

SECTION I THE PRESENT STATUS OF THE FRESH VEGETABLE INDUSTRY

(1) A Short History of Fresh Vegetable Production and Growth

Environment, need, ethnic origin of settlers and market, influenced the early production of vegetables. Their production was essential to survival during early settlement and the stockaded enclosures of trading posts provided areas for production. Settlement and urban development gave rise to demand beyond that which backyard gardens were able to produce. Market gardens came into being and the product, during the growing season and from storage, found its way by itinerant peddlers to the corner store and by the grower to local farm markets. The demand for out-of-season fresh vegetables gave rise to the first greenhouse projects. These sources of production continued to supply the major market requirements until the late 1920's and almost completely disappeared during the 1935 to 1945 period. This disappearance was due to a number of factors including the retirement, by age, of the knowledgeable growers, encroachment on market garden areas by urban and park development, the inability to adapt to large scale modern method of production, and the availability by telephone of large quantities of well graded, attractively packaged produce from other areas.

Edmonton:

Cosmopolitan Edmonton had a three-fold development based on the market gardens of ethnic groups from Europe and the Orient and the greenhouse trade developed by settlers from Britain. Market gardens were found on the lighter, black soils to the north-east and south of the city, while more specialized development flourished on the river bottom alluvial flats. Potatoes, turnips, carrots, parsnips, beets, were the basis of production, supplemented with asparagus, celery, celeriac, cucumbers, tomatoes, vine and salad crops.

Calgary:

Environmental factors made Calgary a much more difficult area for production. Market gardening was largely developed by Asiatic Canadians and some of the enterprises continue in production at this time.

Drumheller and Medicine Hat:

Truck crops were specialized on the alluvial flats of the Red Deer Valley at Drumheller and on the flats of the Saskatchewan River adjacent to the city of Medicine Hat. This specialized production has practically disappeared from the Drumheller Valley area and urban development is pushing it away from the usual growing areas along the South Saskatchewan River. Both of these developments used hot season crops to advantage and Medicine Hat has been widely known for its sweet corn, pepper, outdoor tomato, and onion production. Because of the long hours of effective sunshine and inexpensive gas for heating, the greenhouse industry developed at an early stage and has continued to hold its own and eventually expand at Medicine Hat. Flowers, cucumbers and tomatoes have been their mainstays through the years. With the introduction of irrigation waters to the Medicine Hat area there has been a gradual revival of specialized fresh vegetable crops on the bench lands above the river.

South-west Area:

Vegetable production combined with the introduction of irrigation to south-western Alberta. The pattern of development was much the same as elsewhere with small growers specializing in fresh vegetables and never developing into large commercial producers, with the result that they lost ground to the imported product. Canning crops were largely used by groups within the Church of the Latter Day Saints for replenishing their normal food cellar warehouses. Commercial production was introduced to the Taber district by Mr. and Mrs. Broder; this section of the industry has continued to grow and expand.

Peace River:

Early in the settlement of the Peace River area the alluvial soils and the benches between Peace River and Dunvegan Crossing were used and have continued to be used for fresh vegetable crops. The low elevation, long hours of sunshine, and the extra heat units generated in the deep valley were conducive to the production of early and hot season vegetables. The Peace River area still imports the majority of its fresh vegetable requirements. It is exporting rutabagas to the western United States. Northern transportation is finding some of its requirements from local production.

Extension and Research:

The potential of the early start made by market gardeners in the areas adjacent to the urban centers lacked guidance from Extension Services and the fresh vegetable sections of the local wholesalers failed to encourage their expansion or guide them in their marketing practices. Early horticultural teaching, investigation and extension was directed towards farmstead improvement, home vegetable gardens and surroundings. The greenhouse industry, vegetable canning and potato processing, early found their own way and suffered from lack of professional leadership. Processing and marketing co-operatives were being encouraged as early as 1945. In that year a group of three agrologists and a potato wholesaler were sent to Idaho by the Provincial Department of Agriculture. Their survey report started a new trend. Potato combines, grading equipment, and packaging ideas started to move into the province. Grower groups were organized and production methods gradually changed. Small acreages and small growers dropped from the picture. Large acreages were accompanied by larger more modern planting and harvesting machinery and better storage facilities. In 1961 an agrologist was appointed to the position of Special Crops Supervisor. He devoted a major portion of his time to organizing and developing the Potato Growers Association and they eventually established a Potato Marketing Commission in 1966.

A trip in the spring of 1961 to Arizona and southern California presented an opportunity to investigate the production of fresh vegetables that were finding their market in Alberta. Particular notice was taken of carrots, parsnips, lettuce, radish, onions and celery. The raised bed culture was given a preliminary trial at the Horticultural Station in the summer of 1961 and a pilot vegetable production project was set up in the spring of 1962. This project involved carrots, lettuce, tomatoes, and corn. Carrots received the greatest emphasis and in 1963-64 principles were applied to farmers' production. By 1966 this had been firmly introduced into the production, processing and marketing stream of Alberta's fresh vegetable industry. Parsnips were well received but difficulties were experienced with in-storage darkening. Organization of marketing channels for hydro-cooled fresh corn requires attention. Tomato production was satisfactory, but firm, bruise-resistant varieties were necessary to meet market requirements. Onions are making progress but herbicidal weed control in this field has not found a satisfactory chemical to do the necessary work. Rutabagas require processing studies with respect to grading, waxing, and packaging. Factual knowledge is required on fertilizers, insecticides and disease control products. All of this information is vitally necessary along with a well planned program of encouragement and aid if we are to encroach on the present marketing structure with our own fresh products.

Merchandising:

Fresh vegetable processing, transportation, wholesaling, merchandising, and consumer habits have changed greatly in the last 30 years. Between 1935 and 1945 the chain stores became a part of our merchandising structure. The corner grocer gradually played a smaller and smaller part in supplying the home larder. Between 1945 and 1955 the wholesaler, the broker, and the fresh fruit and vegetable producer in Arizona and southern California developed together to make the green grocer shelf in the modern chain store a very profitable section. With the exception of potatoes, it practically wiped out the producer of fresh vegetables in Alberta. With increasing prosperity you might suppose that individual consumption of food has increased, but surprisingly, per capita consumption of food has not gone up in recent years. If you want to know how much you eat per year it is probably fifteen to sixteen hundred pounds of food. This figure seems to be about the same over the years - regardless of increased population, increased buying power and increased standards of living.

With this in mind, with knowledge of successful production of early market garden producers, with knowledge that these vegetables can be produced on large acreages, stored and processed, the supply to the wholesaler and modern retailer could come from Alberta produce. With the knowledge of a certain increasing demand for fresh vegetables in Canada, in the United States, and in the near European and Asiatic markets, Alberta production should be given every encouragement.

(2) General Conditions in Alberta

Fresh vegetable consumption in the three Western Provinces is important to Alberta. A very large potential consumer's market lies to the south in the U.S.A. The potato industry is presently spear-heading a drive to establish Alberta potatoes in the large west and midwest markets in Los Angeles, San Francisco, Houston and Chicago. The possibility of additional Alberta fresh vegetables following this course may be expected in the future.

The excellence of Alberta grown root-crops such as carrots, beets, parsnips and rutabagas is well-known among horticulturists. Surface crops such as cabbage, lettuce, celery, radish, peas, beans and corn have been grown for several generations in every settled area of Alberta. The potentialities of the irrigation areas for commercial vegetable production have long been realized but only exploited in small part.

While the areas of irrigation must be considered as the most reliable and productive base for large expansion in the vegetable industry, central and northern Alberta also have the growth conditions adequate for the commercial production of the cooler season vegetable crops. The City of Edmonton is currently being supplied, until the month of March, with local carrots, cabbage, beets, turnips, and parsnips. Growers are fast adopting the techniques of unit packaging and eye-appeal by which American products have, up to the present, captured a large share of our domestic market.

The outlook for the expansion of the fresh vegetable industry in Alberta has brightened since 1960, as growers have become aware of the requirements of the industry because of mass marketing techniques. Since 1960, three vegetable plants in the $300,000 to $600,000 capitalization range were set up in the irrigation area. One is a potato processing plant; the other two are vegetable packing plants which will integrate fresh vegetable packing with their present potato business. These two concerns have an initial capacity of 80,000 tons output of potatoes per year. They have negotiated arrangements with the processing plant for disposal of part of their utility potatoes. Several smaller private grower-shippers have also reached the size of industrial firms.

The potato division of the vegetable industry is progressing well and gaining stability through the efforts of the Alberta Potato Growers' Association; by establishment of the Alberta Potato Commission; and, also by the growth of the centralized packer-shipper enterprises.

The rest of the fresh vegetable industry is developing more slowly and is characterized by unco-ordinated market garden production. A recent step in organization has been the formation of a provincial Fresh Vegetable Growers' Association. Another step has been the vertical integration of several grower enterprises into fresh vegetable controlled-storage and packaging. Experimentation in modern storage techniques at the provincial horticultural station at Brooks has encouraged this trend.

Alberta produce accounts for only 40 to 45% of the annual fresh vegetable unloads on Edmonton and Calgary markets. Imports amount to 55 or 60% of total unloads. Alberta's exports which are mainly to Saskatchewan and British Columbia amount to 11% and 8% respectively, of the unloads in those provinces. Alberta fresh vegetables in 1965, including potatoes, were grown on 25,600 acres. Of this, 23,000 acres were potatoes; 2,600 were other vegetables. The total farm value was $7,703,000.

Alberta commercial production has been retarded by:

(1) the wide-spread practice of home gardening.
(2) prior establishment of trade channels with U.S.A. suppliers.
(3) inadequate grading and storing practices.
(4) small-scale units of primary production.
(5) the practice of selling in the flush season.
(6) a localized market outlook.

Commercial vegetable production is carried on from the southern irrigation areas to the Peace River Valley. Abundant natural resources are available to facilitate production in these areas.

TABLE 1

CANADIAN PRODUCTION OF COMMERCIAL FRESH VEGETABLES, 1964[1]

Vegetable	Acres	Tons	Value $
Asparagus	4,030	2,888	1,221,000
Beets	3,220	28,552	1,069,000
Cabbage	7,420	68,318	2,744,000
Carrots	14,270	174,763	7,089,000
Cauliflower	3,150	16,885	1,630,000
Celery	1.110	20,252	1,231,000
Corn (Sweet)	14,260	35,116	2.863,000
Cucumbers	11,190	43,261	3,457,000
Lettuce	4,990	28,253	2,744,000
Onions	9,590	107,861	5,535,000
Parsnips	580	4,777	410,000
Potatoes	281,200	2,386,650	115,159,000
Radishes	-	-	-
Tomatoes	11,390	61,056	6,826,000
Turnips (Rutabagas)	10,300	120,302	3,771,000
TOTAL	376,700	3,098,934	155,749,000

Appendix, pages 2 to 6.

TABLE 2

ACRES OF COMMERCIAL FRESH VEGETABLES - ALBERTA[1]

Vegetable	1960	1961	1962	1963	1964	1965
Cabbage	230	220	230	210	250	260
Carrots	300	290	350	380	400	450
Fresh Corn	700	730	690	770	720	740
Cucumbers	340	370	220	200	190	170
Onions	220	190	280	320	330	400
Potatoes	20,000	20,900	22,000	21,500	21,100	23,000
Turnips (Rutabagas)	350	400	350	410	450	580
TOTAL	22,140	23,100	24,120	23,790	23,440	25,600

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[1] Cat. 22-003. D.B.S., Ottawa.

In regard to export to the U.S.A. and other countries, vigorous efforts were made in 1966 to acquaint the western American markets with Alberta potatoes. Aside from granulated potatoes shipped to England, Alberta vegetables have scarcely entered foreign markets.

TABLE 3

YIELD OF COMMERCIAL FRESH VEGETABLES - ALBERTA[1/]

Vegetable	1960 tons	1961 tons	1962 tons	1963 tons	1964 tons	1965 tons
Cabbage	2,300	2,464	1,616	1,684	1,887	1,735
Carrots	2,850	1,464	3,683	4,003	3,860	2,532
Fresh Corn	2,450	3,102	1,066	3,242	3,600	2,405
Cucumbers	884	1,628	609	479	418	442
Onions	1,320	437	1,274	1,431	1,485	2,676
Potatoes	121,500	127,250	140,000	125,000	121,450	149,900
Turnips (Rutabagas)	4,200	4,000	4,200	5,330	4,500	8,880
TOTAL	135,504	140,345	152,448	141,169	137,200	168,570

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TABLE 4

FARM VALUE, COMMERCIAL FRESH VEGETABLES - ALBERTA[1/]

Vegetable	1960 ($,000)	1961 ($,000)	1962 ($,000)	1963 ($,000)	1964 ($,000)	1965 ($,000)
Cabbage	167	128	97	101	113	90
Carrots	149	94	221	240	309	99
Fresh Corn	98	199	107	259	360	86
Cucumbers	98	173	73	58	42	51
Onions	173	55	153	172	149	224
Potatoes	5,346	5,395	5,270	4,875	9,716	6,750
Turnips (Rutabagas)	168	160	168	213	180	403
TOTAL	6,199	6,204	6,089	5,918	10,869	7,703

[1/] Cat. 22-003. D.B.S., Ottawa.

The increase in the Alberta acreage has been small from 1960 to 1965 except for potatoes, turnips and onions, as shown in Table 2. In Tables 3 and 4, tonnages and values show a slow upward trend. The decreases in cucumbers followed the cessation of a large pickle business in southern Alberta.

Alberta fresh vegetables have a high palatability rating. It could be expected that the commercial acreage would increase in line with the provincial population increase since 1960. However, it did not. Limitations occurred because of:

(1) food merchandising practices introduced into Alberta and maintained by American suppliers and retailers.

(2) local practices of selling field run vegetables in bulk in Alberta.

(3) inadequate storage facilities and practices.

(4) inattention by the trade to local production.

(3) Imported Produce

Rail and truck deliveries of fresh produce are recorded in 12 major Canadian cities. Table 5 shows that Alberta, like the other provinces, receives a very large proportion of its vegetable supplies from external sources. The vegetables concerned are the 15 chosen for study in the report. They constitute over 90% of the fresh vegetables distributed in Canada's markets. For Alberta unloads, refer to pages 7 and 8, appendix.

Alberta's production in carlot unloads is lower than that arriving from external sources. Carlots range in weight from 7 tons of cabbage to 25 tons of potatoes. Graphs, page 9 appendix, show proportionate unloads.

TABLE 5

UNLOADS OF 15 COMMERCIAL FRESH VEGETABLES IN 1965[1/] IN EIGHT MAJOR CITIES OF CANADA

Province	Local[2/] (Cars)	Domestic[3/] (Cars)	Foreign (Cars)	Total
Alberta	1,783	439	2,279	4,501
B.C.	3,167	560	3,122	6,849
Sask.	208	663	1,121	1,992
Manitoba	2,056	234	1,246	3,536
Ontario	7,517	3,499	5,870	16,886

TABLE 6

ACTUAL ALBERTA ON-SEASON SHIPMENTS OF 15 MAJOR VEGETABLES

(Average 1963-1965)

Home Market		To Sask.		To B.C.	
Cars	%	Cars	%	Cars	%
1966	73	202	8	513	19

In respect to Saskatchewan, Alberta and British Columbia, in which provinces 95% of Alberta's fresh vegetables are consumed, records of shipments from Alberta during 1963 to 1965 reveal the figures above.

[1/] Annual Unload Report - C.D.A., Markets Information.

[2/] Produced in Alberta

[3/] Produced elsewhere in Canada.

TABLE 7

CARLOT UNLOADS OF SPECIFIED FRESH VEGETABLES IN ALBERTA[1]

(Average for 1963 - 1965)

Vegetable	ON-SEASON From Alberta Cars	ON-SEASON From B.C. Cars	ON-SEASON Other Sources Cars	ON-SEASON Sub-Total Cars	OFF-SEASON Other Sources Cars	Total Cars
Asparagus	0	0	0	0	0	0
Beets	1	0	0	1	0	1
Cabbage	108	19	51	178	84	262
Carrots	48	19	85	152	47	199
Cauliflower	1	1	20	22	72	94
Celery	0	1	32	33	240	273
Corn (Sweet)	56	14	4	74	34	108
Cucumbers	23	18	8	49	63	112
Lettuce	3	5	108	116	460	576
Onions	20	63	148	231	73	304
Parsnips	0	0	-[2]	-	1	2
Potatoes	1630	75	49	1754	144	1898
Radishes	-	-	5	6	13	19
Tomatoes	2	26	82	110	431	541
Turnips (Rutabagas)	72	2	6	80	4	84

[1] Annual Unload Report.....12 Canadian Markets (C.D.A.).

[2] Less than one.

The Carlot Unload tables account for the major disposition of Alberta commercial vegetables. Edmonton and Calgary, Vancouver, Regina and Saskatoon deliveries (unloads of trucks and cars) are recorded by the C.D.A. According to official sources and the trade, there are some carlot unloads at smaller cities and towns for which there is no record available. For the purpose of approximation, 20 tons may be taken as a carlot equivalent.

TABLE 8

CARLOT UNLOADS OF SPECIFIED FRESH VEGETABLES IN BRITISH COLUMBIA[1]

(Average for 1963 - 1965)

Vegetable	ON-SEASON From Alberta Cars	ON-SEASON From B.C. Cars	ON-SEASON Other Sources Cars	ON-SEASON Sub-Total Cars	OFF-SEASON Other Sources Cars	Total Cars
Asparagus	0	7	2	9	26	35
Beets	0	23	1	24	2	26
Cabbage	9	152	23	184	184	368
Carrots	1	197	164	362	79	441
Cauliflower	0	181	10	191	139	330
Celery	0	133	0	133	228	361
Corn (Sweet)	1	77	13	91	61	152
Cucumbers	0	87	2	89	18	107
Lettuce	0	375	41	416	474	890
Onions	0	121	142	263	72	335
Parsnips	0	4	4	8	8	16
Potatoes	459	1298	419	2176	277	2453
Radishes	0	125	5	130	55	185
Tomatoes	0	83	76	159	457	616
Turnips (Rutabagas)	43	50	5	98	14	112

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[1] Annual Unload Report.....12 Canadian Markets (C.D.A.).

"On-Season" refers to the effective selling period for Alberta shipments of vegetables as recorded in the Unload Reports.

During the period described above, Alberta supplied an average of 459 carloads of potatoes per year to the B.C. market. The "Other Sources" column indicates further market possibilities for Alberta produce.

TABLE 9

CARLOT UNLOADS OF SPECIFIED FRESH VEGETABLES IN SASKATCHEWAN[1/]

(Average for 1963 - 1965)

Vegetable	ON SEASON				OFF-SEASON	
	From Alberta Cars	From Sask. Cars	Other Sources Cars	Sub-Total Cars	Other Sources Cars	Total Cars
Asparagus	0	0	0	0	0	0
Beets	0	0	0	0	0	0
Cabbage	5	18	32	55	85	140
Carrots	0	0	43	43	18	61
Cauliflower	0	0	5	5	18	23
Celery	0	0	27	27	114	141
Corn(Sweet)	1	5	12	18	6	24
Cucumbers	0	0	1	1	10	11
Lettuce	0	0	70	70	255	325
Onions	1	18	92	111	37	148
Parsnips	0	0	2	2	0	2
Potatoes	195	226	169	630	85	715
Radishes	0	0	0	0	0	0
Tomatoes	0	0	55	55	186	241
Turnips (Rutabagas)	0	3	11	14	5	19

[1/] Annual Unload Report.....12 Canadian Markets (C.D.A.).

"On-Season" refers to the effective selling period for Alberta fresh vegetables as recorded in the Unload Reports.

"Other Sources", during the On-Season period, provided a considerable amount of produce for Saskatchewan markets. Alberta should be able to supply considerably more than the recorded 202 tons.

In Table 10, the term "On-season" refers to the months of the year in which shipments of Alberta produce were recorded in the major markets.[1] They covered considerably more than the harvesting period.

The figures apply to the markets of Edmonton, Calgary, Saskatoon, Regina and Vancouver. These markets do not handle commercial produce for many other smaller centers. However, the percentages may be useful in establishing proportionate on-season potentials for Alberta.

There is a probability that present on-season periods are shorter than may be expected in future years when storage techniques improve and marketing connections are built up.

TABLE 10

NUMBER OF PRESENT AND PROJECTED ON-SEASON MONTHS FOR INDIVIDUAL WESTERN PROVINCES[1]

Vegetable	Alberta		B.C.		Sask.		Manitoba	
	Pres.	Proj.	Pres.	Proj.[2]	Pres.	Proj.	Pres.	Proj.
Asparagus	0	2	1.0	2	0	0	1.3	2
Beets	-	9	-	9	-	-	-	-
Cabbage	8.3	8	8.0	7	2.5	3	8.0	7
Carrots	7.3	9	8.3	9	0	0	9.0	9
Cauliflower	0.5	3	7.0	7	0	0	5.0	4
Celery	0	2	3.6	3	0.2	1	4.0	3
Corn(Sweet)	2.0	2	3.0	3	1.3	1.3	1.7	1.7
Cucumbers	6.1	3	8.3	4	0.2	1	3.3	3
Lettuce	1.7	3	7.0	4	0	0	2.3	2
Onions	5.0	9	8.9	9	4.5	4	9.3	9
Parsnips	0	8	4.3	8	0	0	8.0	8
Potatoes	12.0	10	12.0	10	11.1	10	12.0	10
Radishes	0.2	4	7.3	6	0	0	2.0	2
Tomatoes	1.7	2	7.7	3	0	0	3.3	3
Turnips (Rutabagas)	10.0	9	9.0	9	1.3	2	11.3	9

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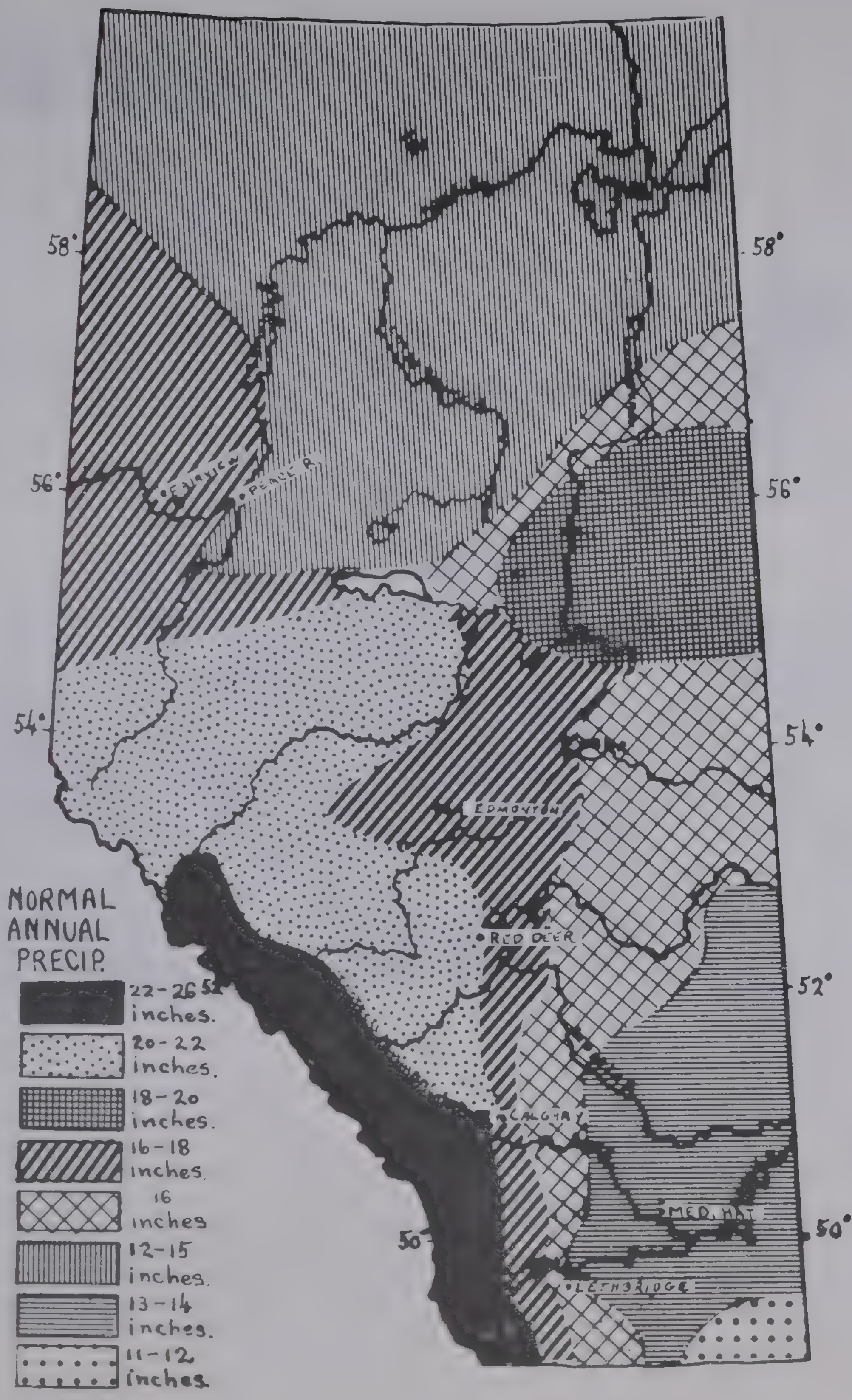
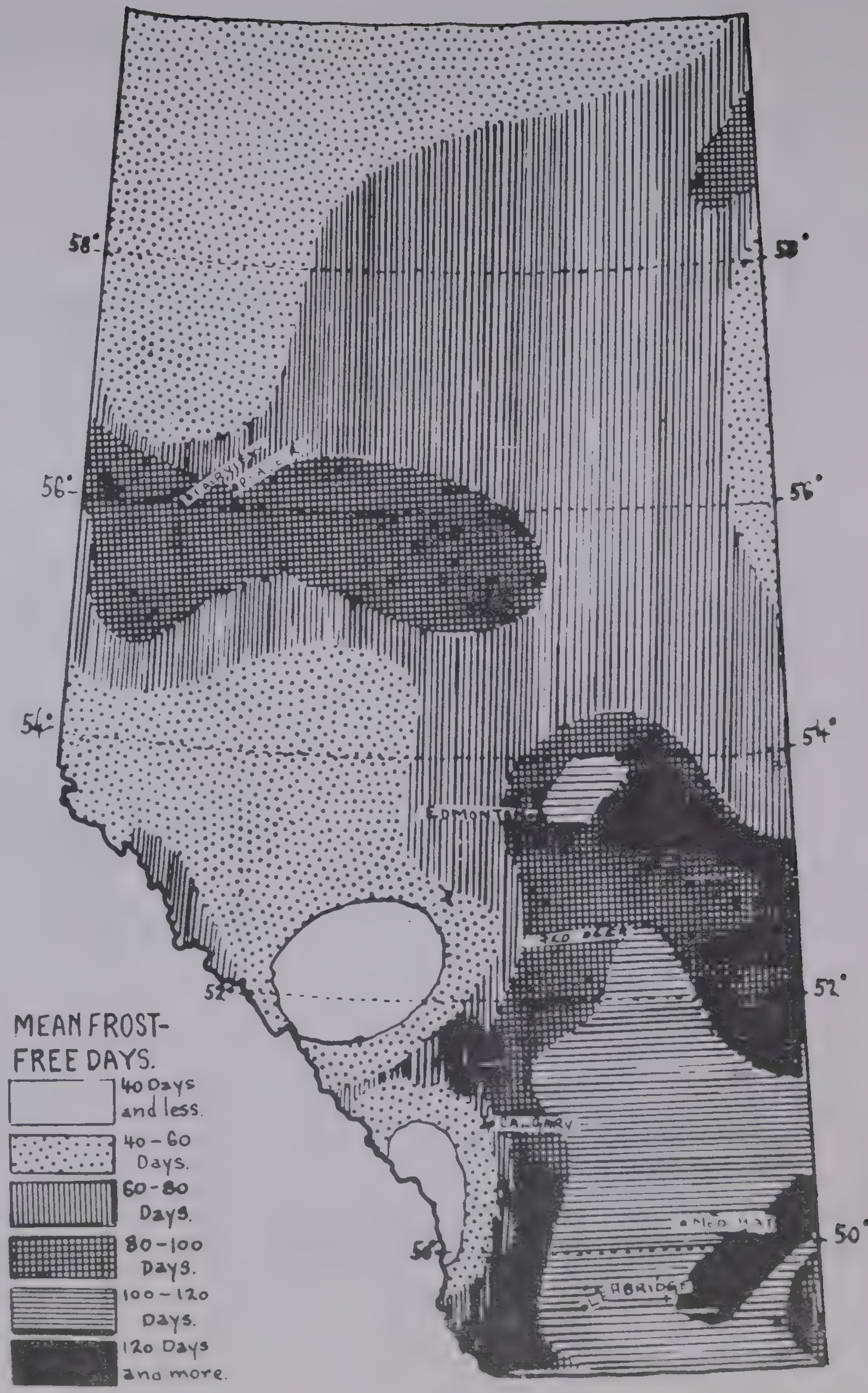
[1] Annual Unload Report - C.D.A., Markets Information.

[2] Excluding greenhouse production.

CROP-INFLUENCING CLIMATIC ZONES OF ALBERTA





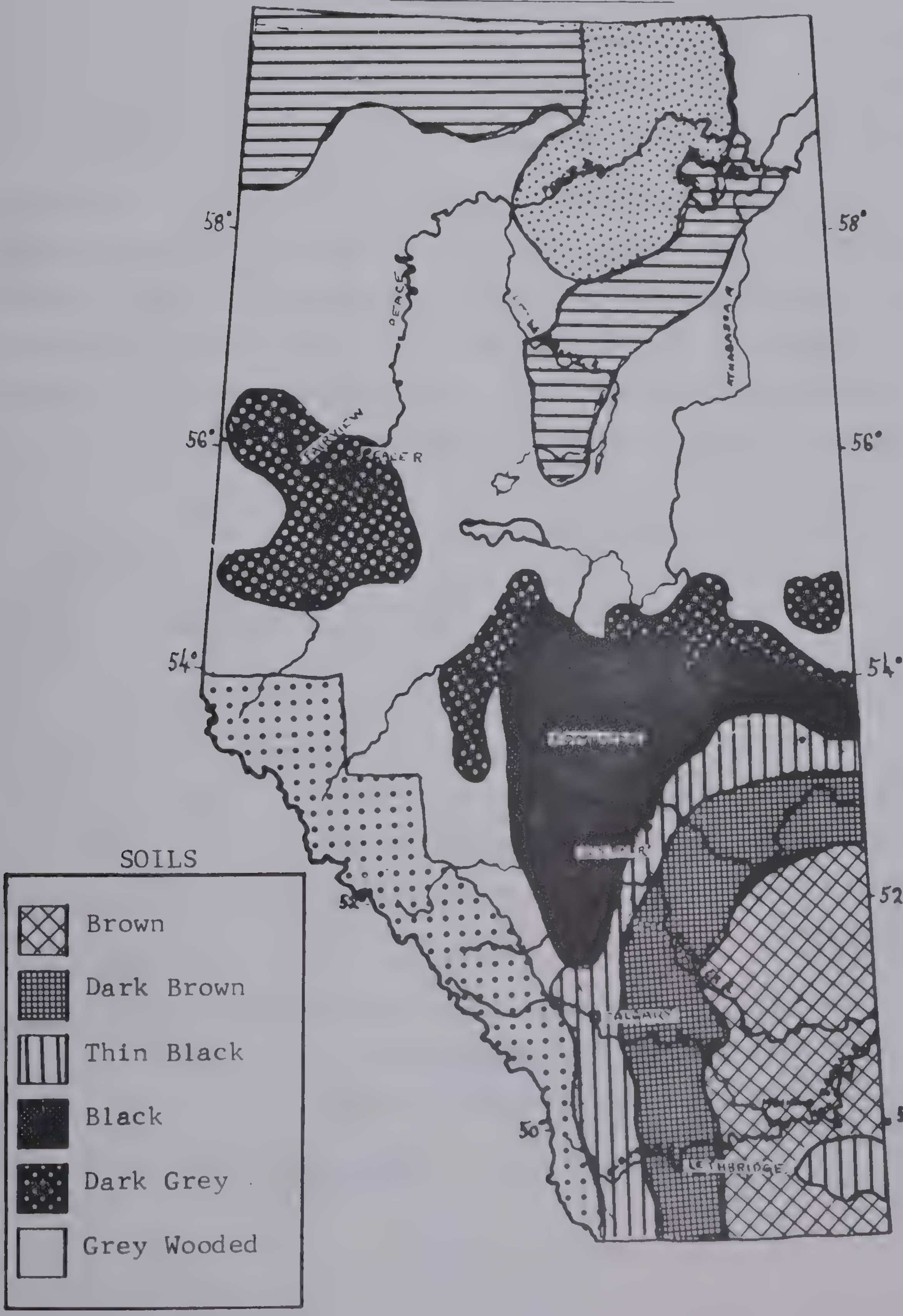
SECTION II SCIENTIFIC AND TECHNICAL PRODUCTION DATA

(1) Soil Zones

Soil zones, which will support commercial production in Alberta, are the Brown, Dark Brown, Thin Black and Black. Irrigation is necessary in the first two zones, and is an important element in a programme of large scale vegetable production in that part of the province. Dark grey soils are productive, particularly in the river valleys.

FIGURE 1

ALBERTA SOIL ZONES



(2) Climate

Climatic conditions establish Alberta as a one-crop per season region, with certain exceptions. Approximately thirty vegetable crops have been recommended as adaptable to Alberta's soil and climatic conditions. Current horticultural bulletins suggested these crops as suitable for commercial production in Alberta.[1] With due regard to the limitations imposed by climate, 15 vegetable crops were selected for study in the project. They are listed below:

(1) Asparagus
(2) Beets
(3) Cabbage
(4) Carrots
(5) Cauliflower
(6) Celery
(7) Corn (Sweet)
(8) Cucumbers
(9) Lettuce
(10) Onions
(11) Parsnips
(12) Potatoes
(13) Radishes
(14) Tomatoes
(15) Turnips (Rutabagas)

Records of the climatic behavior for Alberta (Table 11) from the 49th parallel of latitude to the 56th parallel (near Fairview) revealed conditions which have been observed over a long-term period.[2] The Killing Frost-free period ranges from 15 to 20 days longer than the frost-free period. Recent short term observations show a lengthening of the frost-free period at Edmonton and in Northern districts.

TABLE 11

	Fairview	Edmonton	Red Deer	Leth.	Med. H.
Frost-free days	105	100	93	116	126
Precip., Ap.-Aug. incl.	9.9 "	12.7 "	12.3 "	10.2 "	8.7 "
Precip., Annual	17.32"	17.63"	18.00"	16.10"	13.55"
Degree Days, 42°F.+	2335	2532	2158	2924	3246
Summer Temp. (4 mos.)	56.2°F	58.2°F	57.1°F	60.8°F	62.7°F
Av. Yrly. Temp.	34.0°F	36.9°F	36.8°F	41.8°F	41.5°F
Av. Wind Vel. (Summer)	7.5	7.6	7.7	11.0	9.0

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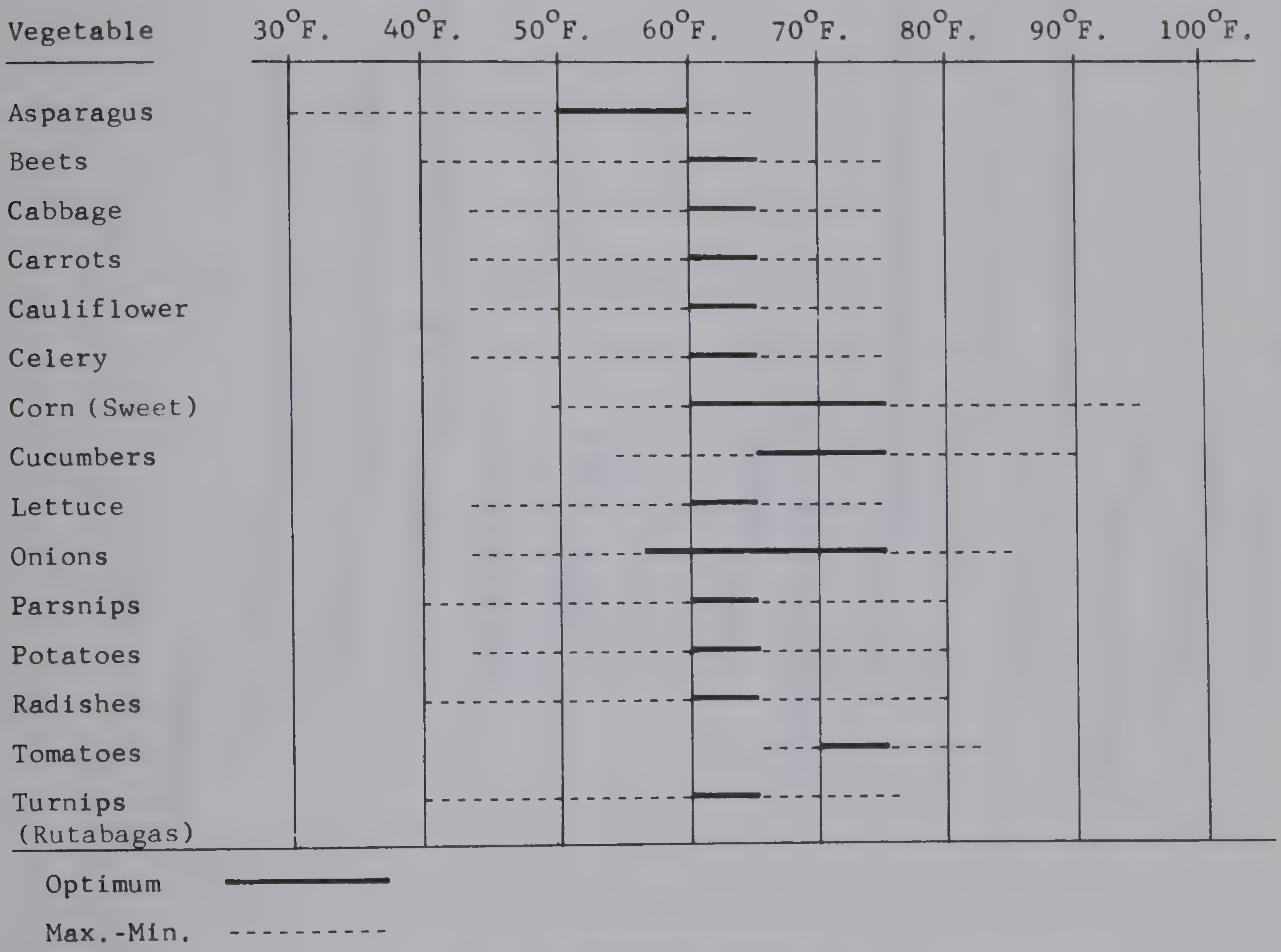
[1] Handbook No. 158, Alberta Dept. of Agriculture.

[2] Meteorological Branch, Dept. of Transport, Ottawa.
C.D.S. - 9-64, Met. Memoirs - No. 17.
Crop Report No. 11, 1966, Alberta Dept. of Agriculture.

TABLE 12

OPTIMUM AND LIMITING TEMPERATURE RANGES FOR GROWTH AND QUALITY[1]



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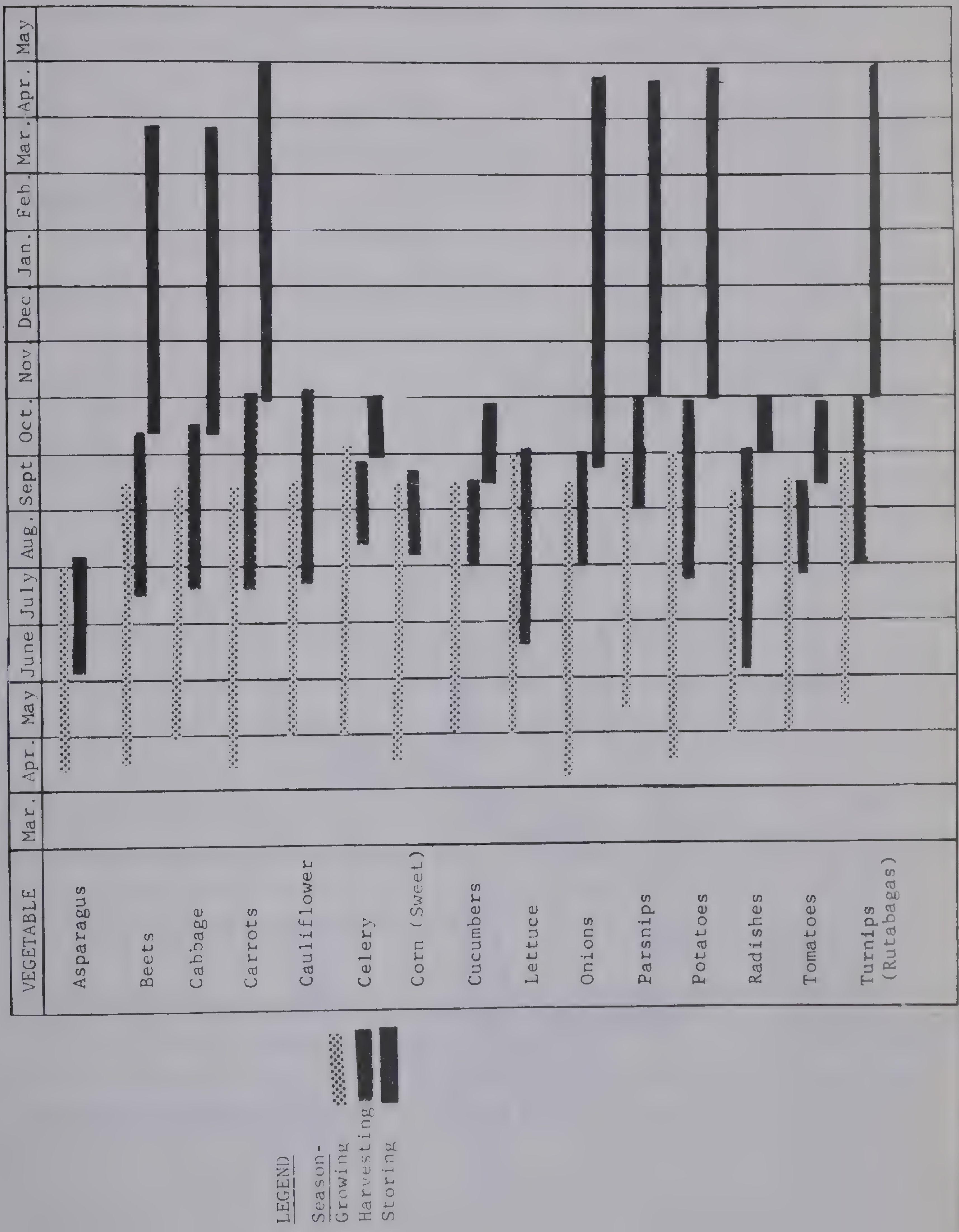
[1] Horticultural Division, University of Alberta.

While the Optimum temperature is best for vegetable production, only a few areas, such as the Salinas Valley, U.S.A., achieve the ideal condition.

In comparing Tables 11 and 12 it may be seen that the summer temperatures for Alberta points are on the low side of the optimum, but within the limiting range for growth and quality for all the listed crops except tomatoes.

Figure 2

APPROXIMATE GROWING, HARVESTING AND STORING SEASONS IN SOUTHERN ALBERTA



The length of the necessary growing season in days must be measured against the length of the frost-free season of the area in which it is proposed that a particular vegetable be grown. The table below shows the approximate ranges in the days to maturity for the group of vegetables.

TABLE 13

APPROXIMATE DAYS TO MATURITY

Vegetable	From Seed	From Transplant
Asparagus	2 years	2 years
Beets	(60 - 90)	-
Cabbage	(70 - 100)	(70)
Carrots	(70 - 100)	-
Cauliflower	-	(100)
Celery	(100 - 120)	(100)
Fresh Corn	(90 - 110)	-
Cucumbers	(90 - 100)	(90)
Lettuce	(60 - 90)	(60)
Onions (Dry)	(100 - 120)	-
Parsnips	(100 - 120)	-
Potatoes	(80 - 120)	-
Radishes	(20 - 25)	-
Tomatoes	-	(110)
Turnips(Rutabagas)	(70 - 90)	-

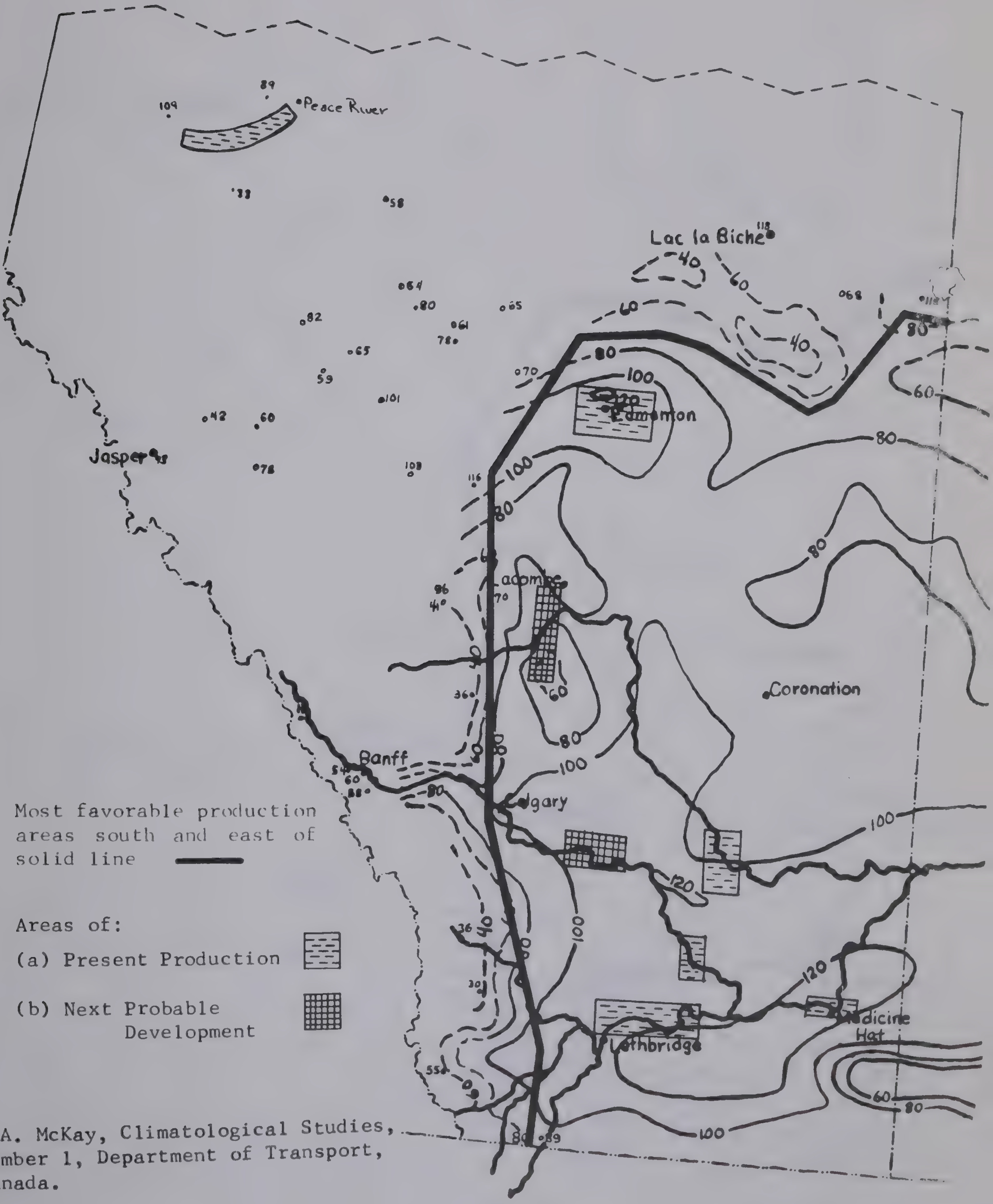
The data above indicate that a growing period of 80 or more days is desirable for production. This requirement has been plotted on climatic maps of Alberta, and a general area has been outlined which combines the climatic, soil and water conditions most suitable for commercial vegetable production.

It is conceded that there are certain favorable production areas outside the boundary; also, there are some unsuitable ones inside. The purpose, however, was to recognize the approximate geographic limits imposed by climate. The figures on pages 21 and 22 show these conditions.

APPROXIMATE BOUNDARIES FOR COMMERCIAL FRESH VEGETABLE PRODUCTION

Fig. 3 **MEAN ANNUAL LENGTH OF FROST FREE PERIOD DAYS**

For Southern Alberta *

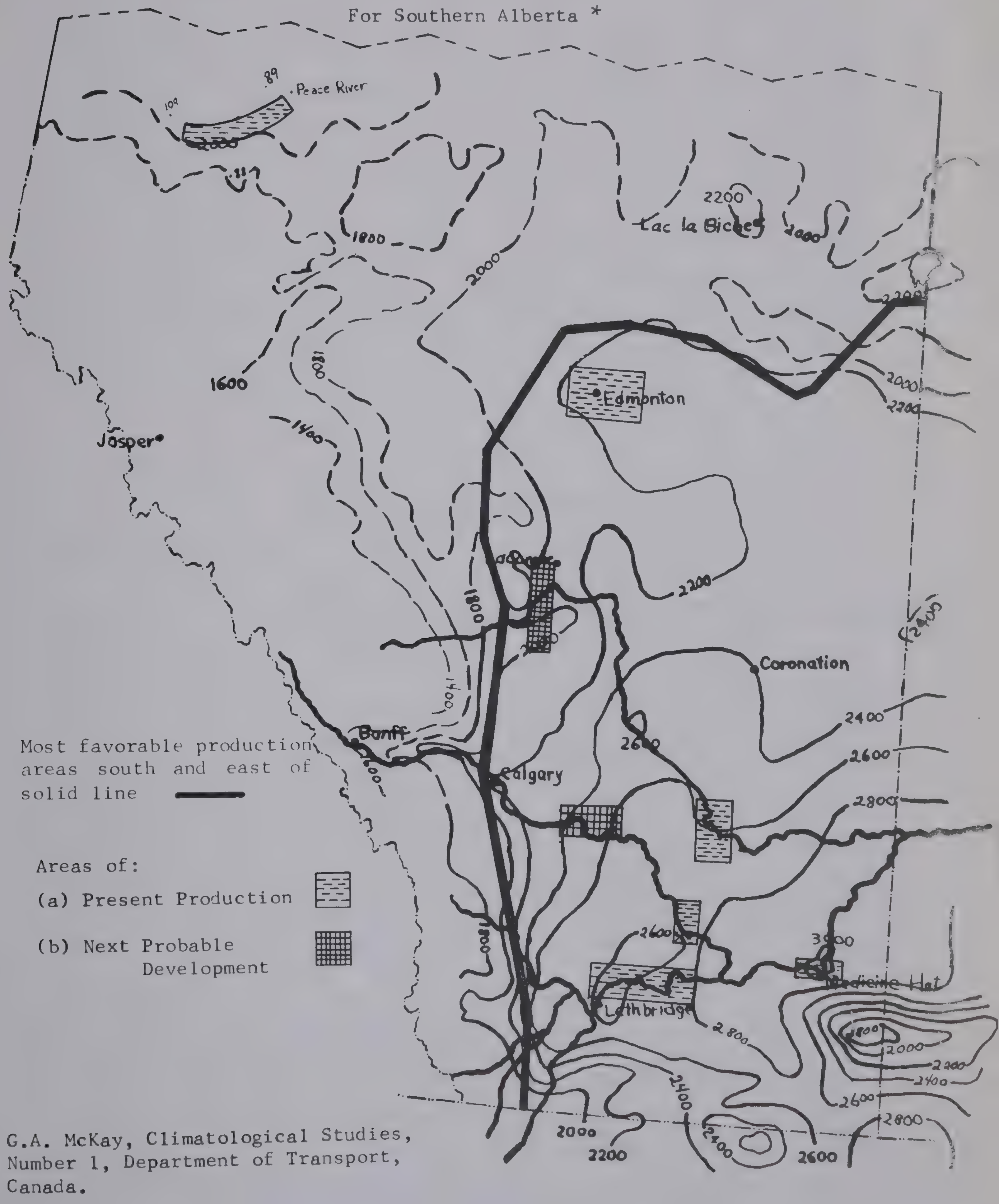


* G.A. McKay, Climatological Studies, Number 1, Department of Transport, Canada.

APPROXIMATE BOUNDARIES FOR COMMERCIAL FRESH VEGETABLE PRODUCTION

Fig. 4

MEAN ANNUAL NUMBER OF DEGREE-DAYS ABOVE 42°F
From May 1 - Sept. 30
For Southern Alberta *



Most favorable production areas south and east of solid line

Areas of:

(a) Present Production ▤

(b) Next Probable Development ▦

* G.A. McKay, Climatological Studies, Number 1, Department of Transport, Canada.

Natural Hazards :

Vegetable production is subject to risks of some kind regardless of the geographical location. California, Texas, Oregon, Florida, Prince Edward Island, Ontario, Alberta and all other areas have to contend with their own special hazards. A few of these risks may be - excessive heat, high winds, fungus diseases, high soil salinity, insect pests, drought, excessive rainfall, frost, nematodes, low soil fertility and others.

The accompanying table refers to commercial production, and represents a consensus of opinion on freedom from natural hazards as they are known at present. The classification following is meant to indicate relative favorability in terms of that aspect. Northern Alberta refers to river valley areas.

TABLE 14

RELATIVE FREEDOM FROM NATURAL HAZARDS

(1) Excellent (2) Very favorable (3) Favorable (4) Fair (5) Poor

	Southern Alberta (Irrigation Areas)	Central Alberta (Didsbury-Edmonton)	Northern Alberta (Peace R.-Fairview)
Asparagus	(2)	(2)	(3)
Beets	(2)	(2)	(3)
Cabbage	(1)	(2)	(3)
Carrots	(1)	(2)	(3)
Cauliflower	(2)	(3)	(4)
Celery	(2)	(4)	(4)
Cucumbers	(1)	(3)	(3)
S. Corn	(2)	(4)	(4)
Lettuce	(4)	(2)	(3)
Onions	(2)	(4)	(5)
Parsnips	(1)	(2)	(3)
Potatoes	(1)	(2)	(3)
Radish	(2)	(2)	(3)
Tomatoes (Fresh)	(4)	(5)	(5)
Turnips(Rutabagas)	(1)	(2)	(3)

(3) Production

Cultural practices with selected varieties developed for the areas has made production possible under Alberta conditions. Selection within these varieties was practised by early horticulturists. Markets for seed of these selections did not develop, and for the most part these useful varieties have been lost.

This is particularly true of sweet corn. Present production is dependent on hybrids developed for other climatic regions but adapted to growing conditions here. Present Alberta breeding programs, for vegetable improvement, are involved with tomatoes, potatoes, cabbages, and beans. These vegetables, as grown elsewhere, have not provided strains suitable to our conditions.

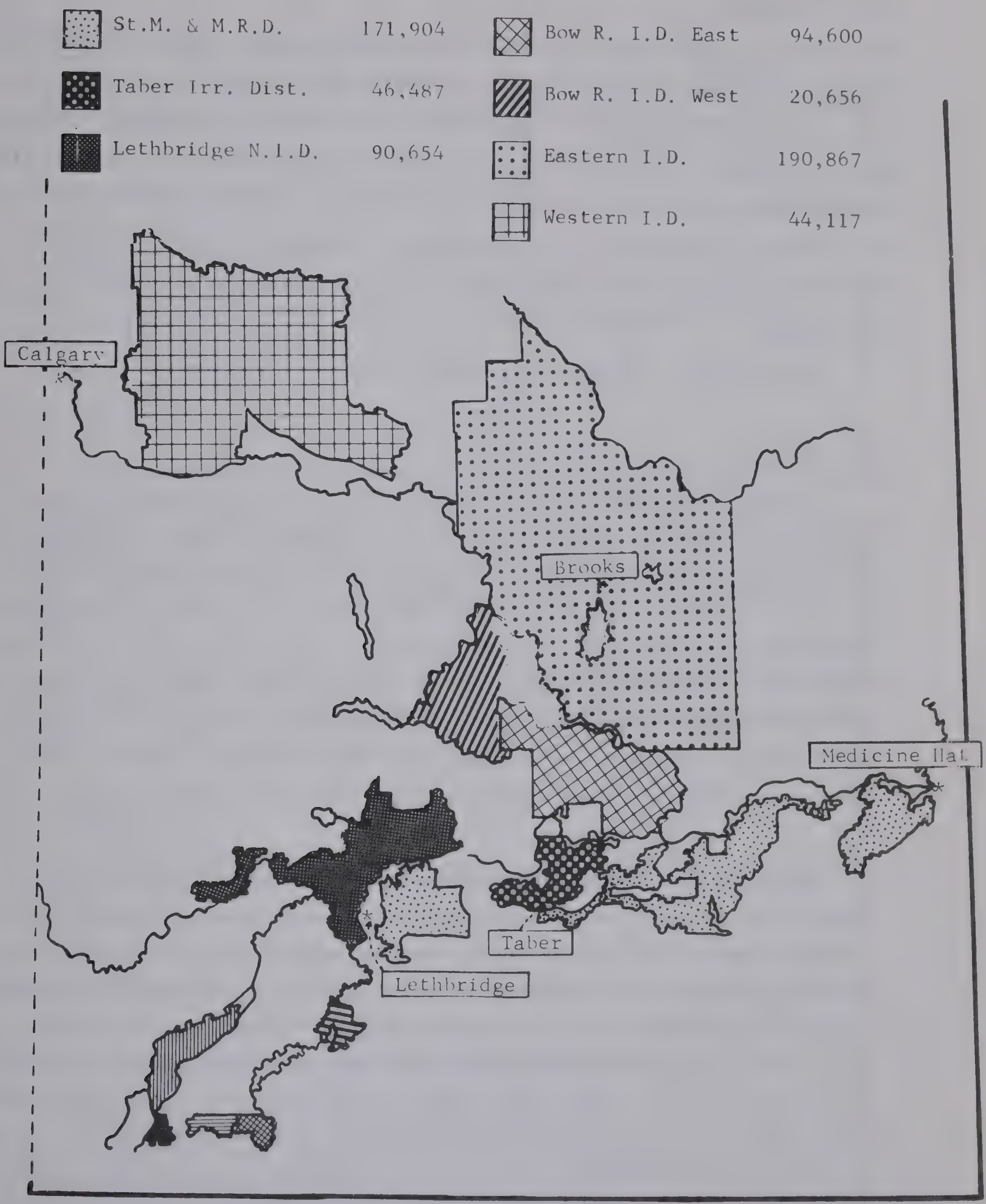
Progress has been greatest in developing new cultural and processing practices. These have used the presently available vegetable strains and have incorporated growing practices peculiar to our area in their production. Further cultural improvements are needed, along with a better knowledge of fertility in production and the use of machinery from seeding through processing.

Alberta vegetable growers have been adopting modern techniques in seed selection, use of chemicals, cultural operations, harvesting, and irrigation methods. Potato production is probably more advanced in terms of the above techniques than other fresh vegetable production. Potato storage practices, also, are superior to that of other fresh vegetables.

Large-scale production of carrots, turnips, cabbages, and other such vegetables, is as yet limited to a few growers. The smaller growers are well aware of the availability and use of specialized planting and harvesting machinery, but they are waiting for a market to develop.

Most of these fresh vegetable growers supply nearby markets and tend to sell their produce as early as possible. All cities and large towns of Alberta support numerous small market gardeners. Much of the produce goes to cafes, hotels, stores and wholesales during the flush season of production when prices are lowest.

Figure 5 MAJOR IRRIGATION DISTRICTS OF ALBERTA[1/]



		Acres			Acres
░	St.M. & M.R.D.	171,904	▩	Bow R. I.D. East	94,600
▓	Taber Irr. Dist.	46,487	▨	Bow R. I.D. West	20,656
█	Lethbridge N.I.D.	90,654	⁘	Eastern I.D.	190,867
			▦	Western I.D.	44,117

[1/] "An Analysis of the Structure of Irrigation Administration in Southern Alberta". G. B. Parlby, Economics Div., Alberta Dept. of Agriculture.

(4) Irrigation

The irrigated areas produce by far the greatest volume of commercial vegetable products in Alberta. These areas may be considered as the greatest potential area for the expansion of the vegetable industry. If extra provincial and foreign distribution of Alberta vegetables is contemplated, a much larger portion of the 800,000 acres under irrigation will be involved.

Irrigation practices are well known to farmers in southern Alberta. Sprinkling equipment is widely used. Abundant water is available from the watershed of the Rocky Mountains.

A map of the irrigated districts is shown on the preceding page.

(5) Storage

Storage investigations, preliminary in nature, indicate that carrots, parsnips, rutabagas, tomatoes, lettuce, radishes, cabbages, onions, beets, Brussels sprouts, cauliflower and celery, can have their market life extended. Cooling or curing, as an integral part of storage, improved and lengthened the shelf life of the product. Based on this work, pilot programs have carried carrot, parsnip, rutabaga, cabbage and onion production into commercial production. Storage conditions, in most cases, are critical. This is basically due to humidity control methods. New storage conditions, based on California developed principles, have proved successful.

Varietal adaptations, ripening and storing methods for tomatoes, celery, and cabbages need projection into applied areas. Tomato varieties, yielding sufficiently heavy crops, are not solid fleshed. Handling for packaging leaves visible bruises which detract from the appearance. This can possibly be overcome by timing of harvest and processing methods. Color loss from green cabbage during storage lowers consumer acceptance. Varietal differences and storage methods can defer this color depletion and extend the marketable period. Other members of the cabbage family, cauliflower and Brussels sprouts, have lent themselves to controlled storage programs. Celery, a high cost crop, can supply from storage an attractive marketable product into the new year.

The development of modern storage facilities has begun on certain vegetable farms in two or three instances. But many growers cannot afford them until a larger market evolves, as from $50,000 to $100,000 of investment is required for root-crop storage and packing enterprise.

Conventional root-house storage may be expected to continue in use among market gardeners and many potato growers. Innovators, however, will adopt controlled-temperature storage if it is financially possible, and thus greatly extend storage life and improve the quality of their produce. This advance must be made individually or collectively in Alberta if the fresh vegetable industry is to expand.

(6) Equipment

Equipment for market preparation of vegetables ranges from minimum grading facilities to sophisticated washing, disinfecting, sizing and packaging units. Packaging units are rare among Alberta fresh vegetable growers, the majority being elemental - adequate for relatively small orders.

As large orders and continuity of supply are essential in the modern practice of the trade, efficient means of vegetable preparation must be utilized to meet these requirements.

(7) Quality

Quality in commercial vegetables is as important as the capacity to produce.

The quality of vegetables is high in Alberta. The palatability and appearance of our domestic produce is pleasing to consumers, particularly in terms of taste and texture. Produce imported into Alberta, on the other hand, is often criticized for tastelessness and softness.

The combination of fertile soil and sunshine and, in addition, the relative freedom from the effects of disease and soil and airborne pests, are natural advantages in the province of Alberta and contribute greatly to the fine table quality of domestic vegetables.

(8) Farm Labor

Farm labor has been getting progressively scarcer in the U.S.A. and Canada since World War II. Federal urban housing programs, public works, and expansion in capital and consumer goods industries have been attracting the farm workers and farm young people to the cities in both countries.

Urban trade and industrial unions became powerful since the war years, and secured wage benefits far exceeding those available to farm workers, the end result being the attraction of farm workers and young people to the cities.

The emphasis on higher education has also served to draw the potential rural population into job careers elsewhere.

The mechanization of farms has been both cause and effect in the migration of the rural population to the urban centers.

These conditions continue to exist; the vegetable industry which is labor-intensive in nature is, therefore, concerned with the availability of labor now and in the future.

The experience of the American vegetable industry in labor matters might be of interest to Alberta vegetable growers.

From the early days, Mexican nationals assisted in most aspects of ranching and farming in the western states. West Indians and negroes worked in eastern and southern states. As fruit and vegetable industries increased in magnitude, laws were passed allowing the seasonal entry of non-immigrant labor into the U.S.A. In the 1950's, this non-immigrant labor became a most important factor in the operation of large scale vegetable operations. These people worked for relatively low wages, and undertook the "stoop labor", while white workers gravitated to towns and cities.

In 1963, labor organizations influenced the American Federal government to repeal the non-immigrant laws. Since that time, labor strife and crop losses have been regular occurrences.

Labor and Vegetable Production:

Among the least labor-intensive crops are potatoes, turnips, carrots, parsnips, beets and onions. Others such as lettuce, cabbages, cucumbers, cauliflower, celery and radishes require a great deal of hand labor in planting, weeding, thinning and harvesting. All the above crops require further labor in market preparation and in storage where this is applicable.

The Present Labor Situation:

Japanese Canadians constituted the work force previous to 1960 in the irrigation areas of the province, after which time, most of them began to operate their own farms. Since then, Indians have been recruited to work in the sugar beet fields. These people also work to some degree in other vegetable crops. It is becoming more difficult to secure adequately experienced workers in vegetable production. In the non-irrigated areas, vegetable enterprises are usually located adjacent to towns and cities. Women from these towns make up the work force with the addition of high school students when available. Though there are experienced women workers, there are very few reliable and regular men available. The following data indicates the use of Indians in the past several years, mainly in the sugar beet fields. No statistics of vegetable workers are otherwise available.

TABLE 15

INDIAN LABOR USE ON FARMS[1]

(Beet Field Labor)

Year	Number	Alberta	Saskatchewan
1961	1,706	25%	75%
1962	1,901	25%	75%
1963	2,384	25%	75%
1964	2,327	25%	75%
1965	2,237	25%	75%
1966	2,500	25%	75%

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[1] Extension Service, Alberta Department of Agriculture.

Conditions:

A maximum allowance of $15.00 is made each Indian for transportation both ways. The Government also pays an average of $2.50 per individual for necessary health services on the job. A contract form is sent to each Indian that is home stating the nature of the work and the contract price for beet work. Each adult signifies, in writing, that he wishes to take this work. The Government then provides a warrant for the transportation allowance for himself and his family, if any, at the rate of $7.50 per person of working age. The Indian negotiates any alterations in the basic contracts with his ultimate employer at the hiring station in Southern Alberta.

TABLE 16

WEEKLY WAGES WITHOUT BOARD - CANADA - 1955-1965

Year	Construction	Manufacturing	Trades	Industrial Composite	Male - Female Help[1/]	
					Alberta	Canada
	$	$	$	$		
1955	62.11	63.48	52.42	61.05	32.38	29.85
1956	68.58	66.71	54.64	64.44	34.38	32.00
1957	73.63	69.94	57.51	67.93	35.92	34.08
1958	74.54	72.67	60.20	70.43	36.38	34.54
1959	76.56	75.84	63.12	73.47	36.85	36.15
1960	80.46	78.19	65.19	75.83	40.54	37.62
1961	82.57	80.73	67.05	78.17	40.84	38.31
1962	85.90	83.17	69.18	80.59	41.85	39.39
1963	90.32	86.24	71.38	83.41	42.23	40.69
1964	95.00	89.73	73.70	81.68	44.92	42.23
1965	109.16	95.06	78.81	91.53	-	-

[1/] Average of January, May and August.

According to recent economic studies in Alberta's irrigation areas, wages for hourly labor in vegetable field work ranges: high school children $.70 - $.90; adults $1.00 - $1.15; and machine operators $1.20 - $1.50. Sugar beet workers receive $.97 - $1.37 per hour, depending on the relative difficulty of the work.

TABLE 17

Average Wages of Male Help - August 15

Province	1960	1961	1962	1963	1964	1965
	- Dollars per Hour -					
Maritimes	0.78	0.81	0.78	0.84	0.88	0.94
Quebec	0.91	0.95	0.94	0.96	1.01	1.11
Ontario	1.06	1.09	1.07	1.12	1.15	1.21
Manitoba	1.06	1.04	1.05	1.08	1.13	1.21
Saskatchewan	1.12	1.15	1.17	1.16	1.17	1.28
Alberta	1.11	1.10	1.18	1.18	1.22	1.30
British Columbia	1.16	1.18	1.23	1.25	1.27	1.31

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[1] Dominion Bureau of Statistics, Cat. No. 21-002.

SUMMARY:

The shortage of adequate labor for vegetable production has curtailed vegetable farm operators' plans for expansion in the past and may be expected to cause the same restraint in the foreseeable future. This is applicable to the vegetable industry in most areas of Canada, except the Maritimes. Similar conditions exist in California and other western states where strikes, minimum wages and labor legislation are further complicating factors.

California's vast vegetable industry has been built on the use of cheap and efficient "bracero" labor. Increased labor costs are a certainty in the above areas. Increased mechanization may substitute for some labor but in many important crops, hand labor will continue to be imperative.

For Alberta vegetable growers, it is probable that many of the Indians will become experienced laborers. However, they are itinerant and, as yet, not fully adjusted to job discipline. Other sources of labor, such as new immigrants or non-immigrants under special permit, would supply much needed labor in the vegetable industry.

SECTION III PRIMARY PRODUCTION COSTS

(1) Basis of Measurement

Success in commercial production of fresh vegetables implies economic capability as well as a favorable growth environment. Production costs must be such that the final product can compete economically in the available market place.

Assuming that Alberta growers can achieve the physical quality and delivery requirements of the trade, the basic question is one of cost. Primary production costs probably should be examined first. If they are low enough to be competitive with other areas and at the same time can permit satisfactory returns to growers, then production can be justified.

Schedules of production costs (Appendix, Schedules 1-7) for fresh vegetables in Alberta have been constructed in this study in order to determine the degree of feasibility.

Previous vegetable studies in Alberta, Manitoba, California, Arizona, Idaho and other States, which supply the Alberta consumer, were used as source data.[1/] Commercial production of certain of the 15 vegetables in Alberta is not yet large enough to ascertain sound data. However, conditions of Alberta land-use, machine-use, labor, taxes, farm supplies and other production resources are known. These known factors were applied to established production techniques from the source data in order to best evaluate costs under Alberta conditions.

The schedules of cost of production were condensed for the purpose of this report. Schedules 1 to 4 exemplify yields, values and costs per acre for production of vegetables under irrigation in Alberta. Schedules 5 to 7 list similar data for non-irrigated areas.

[1/] Production Economics of Fresh Vegetables in Alberta, 1962- 1964.
1961 Annual Convention, Vegetable Growers' Association of Manitiba.
Ontario Dept. of Agr.-Farm Economics, Co-operative & Statistics Branch.
University of California Agricultural Extension Service.
Agricultural Experiment Station, Oregon State College, Corvallis.
Agricultural Experiment Station, University of Idaho.

(2) Components

Fourteen major fresh vegetables are included in the analysis of costs which is set up in the schedules (Appendix, Schedules 1 - 7). Six of them - potatoes, cabbages, carrots, sweet corn, onions and turnips - are produced in significant commercial quantity in Alberta. The other eight may be equally significant in the future, in the form of either fresh or processing crops. These vegetables are asparagus, beets, cauliflower, celery, cucumbers, lettuce, parsnips and tomatoes. The emphasis, in analysis of these crops, is on production for the fresh market.

Enterprise Size:

Production per acre is the basis of costing with the scale of operation being assessed in the following approximate size ranges.

	Size	Vegetable Crops
(1)	10 Acres	- Asparagus, Beets, Cauliflower, Celery, Lettuce, Parsnips, Tomatoes.
(2)	20 - 30 Acres	- Cabbages, Cucumbers, Sweet Corn.
(3)	40 - 50 Acres	- Carrots, Onions, Turnips(Rutabagas).
(4)	100 - 200 Acres	- Potatoes.

Diversity in several of these crops is probably a safeguard against natural hazards. In addition, sufficient land is required for a planned rotation of crops. Root crops are less subject to weather hazards than above-surface crops, but both are subject to insect pests. In addition, a one-crop vegetable enterprise can be severely affected by one year's low market prices. This analysis, while treating each crop separately, does not suggest exclusive one-crop vegetable enterprises.

Receipts and Net Yield:

The first item in the schedules (Appendix, Schedules 1 - 7) is "receipts". This is derived from production multiplied by price.

The Yield figure is considered to be attainable on the average by the application of modern techniques of production. The Gross Yield merely shows that there is a certain portion of the crop which is not suitable for marketing. It may be disposable for livestock. The pack-out from various crops may run anywhere from 50 to 85%.

Price:

The price applied to the Yield represents the approximate delivered price for graded and washed produce. Vegetable prices are extremely variable depending on supply. An accompanying schedule of price ranges for 1966 is shown on page 56. Import and local price differences are largely a matter of seasonal supply.

Production Costs:

The costs of production shown in the schedules include both fixed and variable costs. They are applied to the use of labor, supplies, machines and buildings according to stated operations in the total production cycle. Machine-use schedules for Alberta were employed in costing operations.

In the cases of three root-crops - carrots, parsnips and turnips - the schedule costs include controlled temperature storage. Other vegetables which are normally winter-stored were costed in terms of ordinary root-house storage.

The accounts of carrots and parsnips designate bulk sale procedures and poly-bag procedures with accompanying costs. In this regard, some conception of preparation and selling costs, in association with controlled temperature storage, can be gained.

Cash, or out-of-pocket costs, figure rather prominently as approximations in farm budgeting. These costs are shown in addition to the figures of total costs.

It is recognized that certain growers may purchase their facilities second-hand and they may use them far beyond their normal life. This may give them a considerable cost advantage over the operator who buys such resources new.

Techniques of production vary between individuals. Sometimes, under certain conditions, usually essential operations can be foregone without great loss. However, cultural operations, chemical-use and produce preparation procedures are becoming more refined. Short-cuts can be costly.

Storage Costs:

Controlled temperature storage costs are listed for carrots, parsnips and turnips. The other storable vegetables are costed as in conventional roothouse storage. Market Preparation costs are listed with Storage.

Selling Costs:

These costs have been stated as at least equivalent to selling commission charges. Many operators may handle their own sales and transport. Since distances are not uniform, the selling assessment indicates a charge which may be for either or both functions.

Costs in Other Areas:

Many of our vegetable imports come from the U.S.A. - California in particular. Additional "imports" come from Ontario, P.E.I. and British Columbia.

Studies of production costs from some of these areas have been assembled and summarized. Schedule 8 in the Appendix contains comparative data that should be of some concern to Alberta growers.

(3) Profitability

Profitability for the fresh vegetable producer is governed by two aspects: (a) production costs, and (b) prices received. Success, for an Alberta Industry, requires that farm costs, storage costs, transportation costs, quality, continuity, wholesale policy and consumer acceptance be such that competition from elsewhere can be met on equal grounds.

A favorable degree of profitability from the growers' point of view is indicated in most of the vegetable crops listed in the Appendix, Schedules 1 - 7. Using the major home markets as the sales areas, Alberta growers can compete successfully. On the basis of delivery at the wholesale location, margins above total costs range from $379 to -$179 per acre on irrigated crops and from $355 to $9 on dryland enterprises.[1]

While none of the selected crops are considered to be totally unacceptable economically or horticulturally, certain of them are not recommended as promising commercial undertakings in Alberta at present.

A table of relative degrees of risk, due to natural hazards, may be found on page 23. The following list is a preferential arrangement on economic and other grounds in the choice of fresh vegetable enterprises.

Suggested Order of Preference:

1. Carrots
2. Potatoes
3. Cabbages
4. Turnips (Rutabagas)
5. Fresh Corn
6. Onions
7. Lettuce
8. Parsnips
9. Cucumbers
10. Beets
11. Asparagus
12. Celery
13. Radishes
14. Cauliflower
15. Tomatoes

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[1] See Appendix, Tables 28A and 28B.

Retail, wholesale, processing, transportation and other businesses, over a period of time, develop a scale of mark-ups, margins, commissions, etc. which become accepted as normal. Grower or grower-shipper margins of profit, on the other hand, vary widely depending on surplus or shortage conditions and distances to markets.

Alberta growers, in supplying both near and distant points, should recognize that they may experience the following conditions of profitability:

(a) A margin above total costs
(b) A margin above cash costs
(c) Recovery of cash costs
(d) Insufficient receipts to cover cash costs

Ordinarily, local markets allow a larger profit than distant markets because of the lesser transportation costs. As the distances from source to market increase, the grower-shipper normally expects some trimming of his margin. Depending on his alternative opportunities, he will take the best of the choices numbered above. The shipper of loads of mixed vegetables may take a loss on one kind of produce in order to secure a profit on the more profitable items.

Comparison of Alberta and Other Producing Areas:

Alberta is particularly suited to the production of fresh vegetables. Area variation in climate makes it possible to grow cool and many hot season crops. The latter are available for short seasons but these short seasons are, fortunately, timed for low production periods in other supplying areas. These periods of short supply are dictated by very high temperatures in our normal supply areas. This is particularly true with the tomato supply, which is short from the the middle of August to the latter part of September and which period covers the peak of our potential supply. Due to these same high temperatures we have a monopoly in the supply of rutabagas to southern markets.

Florida, Texas, Arizona, and California have been our normal fresh vegetable suppliers. They all have irrigation practices similar to ours on land that has a much higher capital value and is not as naturally fertile. California, in particular, because of its desert and maritime environments, is particularly suited to production of most vegetables over a long production season. It is this production with which we must compete. Our advantage is lower production costs, high flavor quality, long transportation routes and protective duties.

Idaho produces, under somewhat similar climatic conditions, potatoes and onions. The varieties and cultural practices employed are basically similar. Our processing and marketing techniques are not as far advanced but we do benefit from their past experience.

Ontario has a developing fresh vegetable industry. We have suffered from distress selling of their vegetable products. This is particularly due to preferential rail rates. Carrots, cucumbers and processed vegetables have borne the weight of these difficulties.

Note:

From comparison of data shown in the Appendix[1], the Alberta costs are lower than the average sample of American costs except for approximate equality in lettuce and onions, and higher costs for celery, cucumbers and tomatoes. The Alberta costs include storage expense for potatoes, carrots, beets, cabbages, onions, parsnips and turnips. These costs, except for potatoes, are usually minimal in the U.S.A.

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[1] See Appendix, Tables 28A & 28B, and Schedule 8.

SECTION IV DISTRIBUTION AND SUPPLY

Part I - THE MARKET

(1) The Impact of American Technology on the Fresh Vegetable Industry

In the pioneer stages, many local growers supplied small separate concerns such as retail stores and private individuals in their own communities. Prior to the advent of rapid transportation, evolving around the time of World War II, this was the common situation in Europe, Canada and large regions of the U.S.A.

Since the War, techniques of production, preparation, packing and transportation progressed swiftly, particularly in the U.S.A. Mass merchandising by food chains rapidly accelerated the distribution of foods of every kind, and introduced fresh vegetables into towns and cities hundreds of miles distant from the source of production A most significant part of this merchandising was the provision of strictly graded, attractively packed vegetables which excelled locally grown produce in appearance, packaging and convenience. A direct result was the gradual disappearance of innumerable local suppliers and the loss of their business. The nature of the enlarged market necessitated that wholesalers have a uniform, sure supply. Broker services increased the ease of ordering.

This technological revolution was of dual character. The first aspect was the maturing of food chains into tremendous mass buying and selling organizations which demanded excellent quality and an extensive and continuous flow of supplies for the consumer. The second aspect was the response of agriculture to these demands which, in turn, initiated the development and use of agricultural chemicals, fertilizers and mechanical inventions for fresh produce production. Simultaneously, areas capable of giant supply and versatility in fruit and vegetable production were opened up in the western states of the U.S.A.

The deserts and drylands of southern California, Arizona and Texas, under irrigation and relatively free from the seasonal sub-zero temperatures common to much of the rest of the U.S.A., have, in the last fifteen years, become the largest continental suppliers of fresh vegetables for the U.S.A. and Canada.

This could not have been accomplished without the presence of a huge population, a national network of highways and railroads, and a system of rapid communication.

This accomplishment was not spontaneous. It was an outcome of highly concentrated financial planning in the food retail sector, combined with American ingenuity in production.

European Practice:

In continental Eurpoe, supermarkets are appearing in the larger cities, and fresh vegetables are marketed as in Canada and the U.S.A. In contrast in many other European, Latin American, African and Asian food markets, it is evident that the centuries old method of bargaining in the market place between grower-vendors and consumers is yet the common means of moving fresh produce into consumption.

(2) The Marketing Function

The mass marketing of vegetables occurs in large grocery stores or supermarkets which are usually associated through a system of common wholesaling, or which are units of a chain. Chains may be regional, national or international in scope. Some have integrated wholesaling and processing functions to serve their widespread retail outlets. The grocery business in Alberta towns and cities is experiencing a rapid transition to this type of food dispersal. Vegetable production must be adapted to the requirements of this kind of merchandising if it is to compete successfully for the consumer's dollar. Individual trading between the small grower and retailer will become of diminishing importance in the marketing of commercial vegetables.

Three important conditions for the retail trade are:

(a) uniformity of product
(b) uniformity of price
(c) continuity of supply

From the consumer's point of view, the foregoing conditions are of interest. Price is the main matter of concern to him. From the grower's point of view, a larger percentage of farm produce must be culled to give uniformity. The produce may be perfectly palatable but too large, too small or unevenly shaped to be accepted by chain food stores.

The national retail and wholesale chains are immense buyers and knowledgeable of the market place, so they tend to impose a price ceiling on produce at the farm level that is difficult to break through. Co-operative or private grower-shipper integration has developed - partly to offset this condition.

The uniformity and continuity of produce causes buyers to deal with large, long established sources of supply and to refrain from dealing with local growers. Many of the local growers are small and, in the language of the wholesale trade, are "nuisance growers". Their produce is often regarded as of stop-gap value.

Production in the future, therefore, would appear to require a higher degree of specialization on the farm in order to secure a greater percentage of marketable product per acre and greater dexerity in the market place through association and integration of packing and shipping activities on the part of the growers.

(3) The Market Area

The market area is commonly understood to mean the geographical area for consumer sales, and also applies to the density and buying capacity of the population in the area.

In this connotation, the villages, towns and cities of Alberta are all market areas in themselves. In the larger sense, the provinces of Alberta, British Columbia, Saskatchewan and Manitoba are market areas.

The contrast in the market capacity for fresh vegetables may be seen by noting the 1966 consumer populations of Edmonton (401,000), Regina (131,000), Toronto (2,159,000) Los Angeles (6,500,000); and, Alberta (1,463,000), Saskatchewan (955,000), British Columbia (1,873,000) and California (19,500,000).

The area of land in Alberta available for growing a variety of vegetable products far exceeds the present capacity to consume in the four western provinces, and suggests a consideration of other market areas for the future

(4) Market Communication

Networks of telephone and teletype services in the U.S.A. enhance communications between areas of vegetable supply and consumption. These channels of communication also reach into large Canadian centers of distribution.

Wholesale and retail food chain headquarters are constantly in touch with their broker and buyer representatives. This ease of communication is an essential function in the movement of perishable commodities.

Good communication tends to boost the sale from large producing areas and, generally, because of its absence in small supply areas, tends to hold back development. In Alberta, the latter situation has existed for many years. Alberta potatoes are now receiving a degree of orderly marketing as communication is improved and assembly difficulties are being overcome. The production of other vegetables has been retarded by aggressive entry of American supplies into our market. These other fresh vegetables such as carrots, onions, celery, peppers, cauliflower, and Brussels sprouts, have been grown by numerous small growers who were not able to develop good communications with buyers and were, therefore, disregarded by the industry in their home province.

(5) The Consumer Population

The process of creating a market for foods is often accomplished through sophisticated promotion. To the degree that consumer income, tastes, and habits respond to this, a market is established. The consumer population then determines the size of the market.

A table of population, projected to 1981, may be found on page 45. These projections apply to the four western provinces and Canada in total. As the population expands, consumption of vegetables also expands. The proportions of fresh vegetables, frozen vegetables and canned vegetables appear to be altering in favor of frozen and packaged foods to accomodate common household trends. The customary rate of consumption of fresh vegetables is changing slowly over the years. Table 18 on page 43 shows per capita disappearance of the major fresh vegetables. In recent years, each Canadian has consumed 221.7 pounds of fresh vegetables per year and 102.5 pounds of processed and frozen vegetables. Table 18 lists the potential periods of delivery in Alberta and the important vegetables in terms of per capita consumption.

TABLE 18

AVERAGE PER CAPITA CONSUMPTION AND SEASONALITY OF SELECTED FRESH VEGETABLES IN CANADA[1]

1962 - 1964

	Fresh Equivalent	
Vegetable	Alberta Season Months	Yearly Average[2] lbs.
Asparagus	2	0.2
Beets	9	2.2
Cabbage	8	8.7
Carrots	9	14.9
Cauliflower	3	1.7
Celery	2	6.0
Fresh Corn	½ Season	5.1
Cucumbers	3	1.8
Lettuce	3	8.3
Onions	9	11.3
Parsnips	8	0.5[3]
Potatoes	10	136.0
Radishes	4	1.0[3]
Tomatoes	2	14.8
Turnips (Rutabagas)	9	5.4
TOTAL		217.9 lbs.

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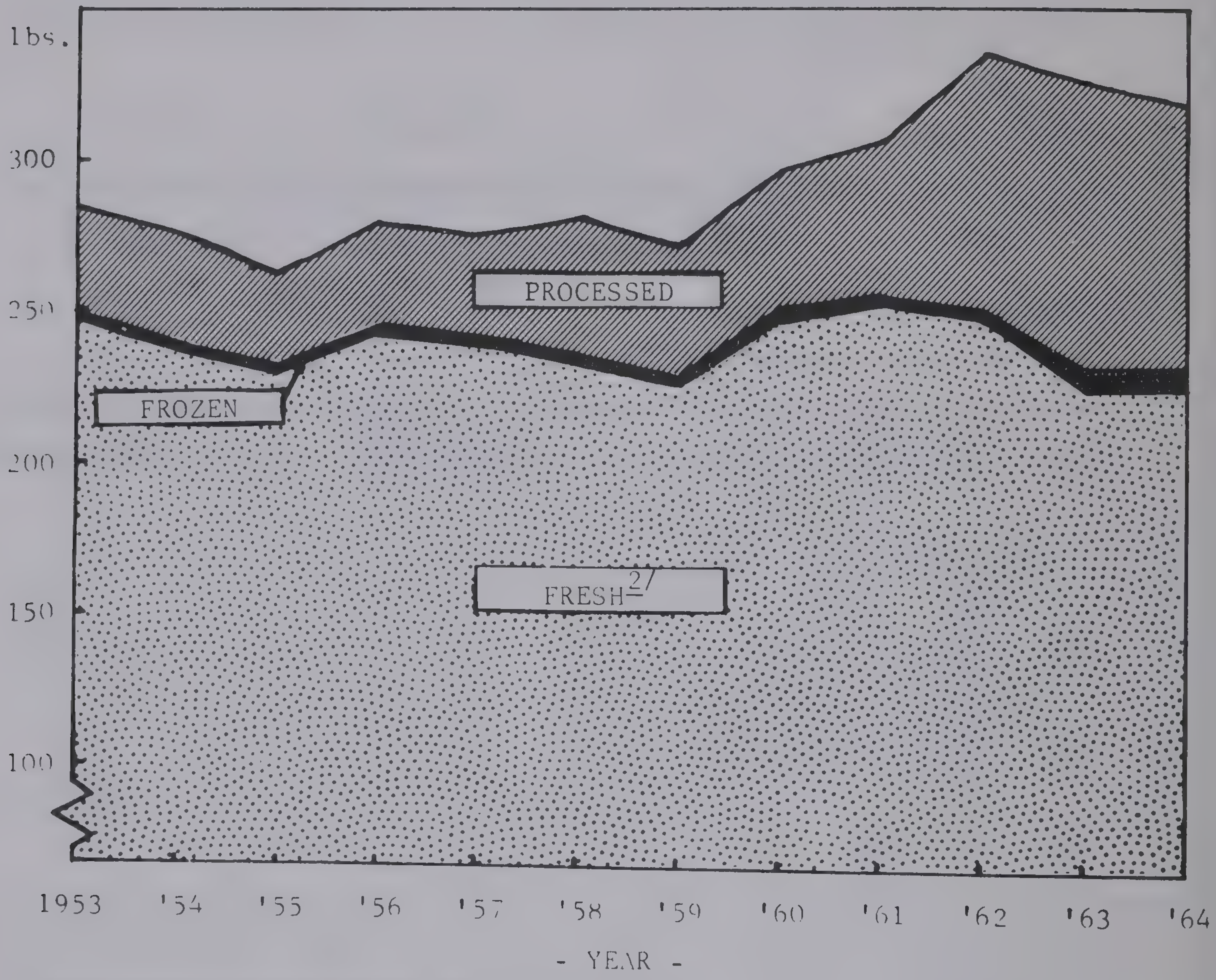
[1] Markets Information, C.D.A.

[2] Markets Information, C.D.A., Cat. 322-26.

[3] Estimated consumption per capita.

Figure 6 TRENDS IN CANADIAN VEGETABLE CONSUMPTION[1]

(Fresh Equivalent)



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[1] Apparent per Capita Domestic Disappearance of Food in Canada - Includes tomatoes and potatoes. C.D.A., Cat. 322-26

[2] Includes Vegetables Otherwise Used.

TABLE 19

POPULATION PROJECTIONS FOR FOUR WESTERN PROVINCES

(to nearest thousand)

Year	Alberta[1]	B.C.[2]	Sask.[2]	Manitoba[3]	Canada[2]
1961	1,332,000	1,629,000	925,000	921,686	18,238,000
1964	1,442,000	1,778,000	950,000	959,000	19,533,000[4]
1966	1,516,000	1,877,000	967,000	984,000	20,397,000
1971	1,719,000	2,163,000	1,011,000	1,062,700	22,862,000
1976	1,950,000	2,498,000	1,066,000	1,151,700	25,730,000
1981	2,204,000	2,912,000	1,153,000		30,478,000

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[1] Alberta Bureau of Statistics, 1965.

[2] Tech. Bulletin #29, U.B.C. Research Council, 1963.

[3] C.O.M.E.F. Report, Manitoba. Years represented are 1961, 1964, 1965, 1970, 1975 respectively.

[4] Three fifths increase, 1961-1966.

TABLE 20

CITY POPULATION - 1966[1]

METROPOLITAN AREA

Calgary	330,575	Ottawa	494,535
Vancouver	892,286	Quebec	413,397
Toronto	2,158,496	Windsor	211,097
Edmonton	401,299	Winnipeg	508,759
Hamilton	449,116	Victoria	173,455
London	207,396	Regina	131,127
Montreal	2,436,817	Saskatoon	115,892

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[1] Census of Canada, 1966.

Part II - MARKET PROJECTION TO 1981

The potential market for Alberta fresh vegetable producers includes the three most westerly provinces, which constitute the significant marketing area at the present time. In this area, the short haul to Saskatchewan and B.C. points, the limited area for production in B.C. and the emphasis on the wheat economy of Saskatchewan are, and will continue to be, influences favorable to the expansion of the Alberta vegetable industry.

More distant markets are also possibilities in the future.[1] It appears that storable crops such as potatoes, carrots, turnips, cabbage, parsnips and beets will participate in other Canadian markets. Summer vegetables probably will be of minor significance because of generally flush production in all areas during this season.

A factor of quality, identified with a specific area of production, can overcome freight and tariff limitations to some extent. Idaho potatoes are a specific example. Alberta potatoes, in recent market tests in large cities of the U.S.A. and Canada, have been received as top quality produce. This quality aspect, which is reflected in the appearance and palatability of the Alberta vegetables named in the preceding paragraph, can assist in establishing market acceptability by reputation.

The subsequent tabulated projections of the potential fresh vegetable market for Alberta apply to British Columbia, Alberta and Saskatchewan. In this general area, the census for 1966 placed the population at 4,290,000. The market will probably continue to be divided between local, other domestic and foreign sources.

For the purpose of market analysis, it is assumed that Alberta will be able to supply the total On-season requirements for the vegetables studied for the home market.[2] Further, Alberta will be able to supply On-season vegetables to B.C. and Saskatchewan except for the amount of the respective local production. Off-season supplies will continue to come from customary sources such as California, Texas and Mexico. The On-season period, as distinguished from Off-season, includes the effective length of storage time as well as the harvesting period.

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[1] See "Some Applications of Freight Rates," Page 31, Appendix

[2] See Table 21, page 47.

Tables 21 and 24 set out the estimated market tonnages required to fill the available market for Alberta fresh vegetables in the three western provinces.

The Alberta On-season period was taken as the basic time period of supply.[1] The elements of - (1) all-source On-season unload percentages in the 1963-'65 period, (2) per capita disappearance of commercial vegetables, and (3) provincial population projections were used to compute the available markets for the years 1964, 1966, 1971, 1976 and 1981. The latter four years are represented in the following tables.

TABLE 21

THE POTENTIAL MARKET FOR ALBERTA FRESH VEGETABLES IN ALBERTA[2]

Vegetable	1966 tons	1971 tons	1976 tons	1981 tons
Asparagus	25	28	32	37
Beets	1,668	1,891	2,145	2,424
Cabbage	4,484	5,085	5,768	6,520
Carrots	8,583	9,733	11,041	12,480
Cauliflower	296	336	381	430
Celery	546	619	702	793
Corn (Sweet)	2,667	3,025	3,431	3,878
Cucumbers	600	681	772	872
Lettuce	1,258	1,427	1,619	1,830
Onions	6,510	7,381	8,373	9,464
Parsnips	126	143	162	183
Potatoes	94,841	107,541	121,992	137,888
Radishes	243	275	312	352
Tomatoes	2,244	2,544	2,886	3,262
Turnips (Rutabagas)	3,889	4,409	5,002	5,654
TOTAL	127,980	145,118	164,618	186,067

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[1] Table 18, page 43.

[2] Based on Alberta Percentage On-Season Carlot Unloads x Per Capita Disappearance. Table 7, page 11.

TABLE 22

THE POTENTIAL MARKET FOR ALBERTA FRESH VEGETABLES IN BRITISH COLUMBIA[1/]

Vegetable	1966 tons	1971 tons	1976 tons	1981 tons
Asparagus	11	13	15	18
Beets	83	95	110	128
Cabbage	735	847	978	1,140
Carrots	5,174	5,962	6,886	8,029
Cauliflower	48	55	64	75
Celery	0	0	0	0
Corn (Sweet)	431	496	573	668
Cucumbers	34	39	45	52
Lettuce	389	449	518	603
Onions	4,454	5,133	5,928	6,912
Parsnips	117	135	156	182
Potatoes	45,949	52,950	61,151	71,302
Radishes	28	32	37	43
Tomatoes	1,667	1,921	2,218	2,586
Turnips(Rutabagas)	2,179	2,511	2,900	3,382
TOTAL	61,299	70,638	81,579	95,120

[1/] Based on Alberta Percentage Carlot Unloads x Per Capita Disappearance. Table 8, page 12.

TABLE 23

THE POTENTIAL MARKET FOR ALBERTA FRESH VEGETABLES IN SASKATCHEWAN[1/]

Vegetable	1966 tons	1971 tons	1976 tons	1981 tons
Asparagus	16	17	18	19
Beets	177	185	195	210
Cabbage	1,094	1,143	1,206	1,304
Carrots	5,043	5,272	5,559	6,014
Cauliflower	181	189	199	215
Celery	551	576	608	658
Corn(Sweet)	1,332	1,392	1,468	1,588
Cucumbers	78	82	86	93
Lettuce	883	923	973	1,052
Onions	3,442	3,599	3,794	4,105
Parsnips	40	42	44	48
Potatoes	33,536	35,061	36,969	40,000
Radishes	77	80	85	92
Tomatoes	1,646	1,721	1,814	1,963
Turnips(Rutabagas)	1,514	1,583	1,669	1,806
TOTAL	49,610	51,865	54,687	59,167

[1/] Based on Alberta Percentage Carlot Unloads x Per Capita Disappearance. Table 9, page 13.

TABLE 24

COMBINED POTENTIAL MARKET FOR ALBERTA FRESH VEGETABLES IN THE THREE WESTERN PROVINCES[1]

Vegetable	1966 tons	1971 tons	1976 tons	1981 tons
Asparagus	52	58	65	74
Beets	1,928	2,171	2,450	2,762
Cabbage	6,313	7,075	7,952	8,964
Carrots	18,800	20,967	23,486	26,523
Cauliflower	525	580	644	720
Celery	1,097	1,195	1,310	1,451
Corn (Sweet)	4,430	4,913	5,472	6,134
Cucumbers	712	802	903	1,017
Lettuce	2,530	2,799	3,110	3,485
Onions	14,406	16,113	18,095	20,481
Parsnips	283	320	362	413
Potatoes	174,326	195,552	220,112	249,190
Radishes	348	387	434	487
Tomatoes	5,557	6,186	6,918	7,811
Turnips (Rutabagas)	7,582	8,503	9,571	10,842
TOTAL	238,889	267,621	300,884	340,354

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[1] Based on Alberta On-Season Percentage Carlot Unloads x Per Capita Disappearance. Tables 7, 8 and 9, pages 11 to 13.

Alberta acreages necessary to supply the available markets for the years stated in Table 25 are as follows.

The yields per acre in Column I are considered to be marketable yields excluding farm cullage.

TABLE 25

ESTIMATED ACREAGE OF VEGETABLES (ON-SEASON) REQUIRED TO FILL THE AVAILABLE ALBERTA MARKET[1]

Vegetable	Yield/ Acre tons	1966 acres	1971 acres	1976 acres	1981 acres
Asparagus[2]	1.25	19	20	26	30
Beets	8.00	208	236	268	303
Cabbage	8.00	561	636	721	815
Carrots	10.00	858	973	1,104	1,247
Cauliflower	5.00	59	67	76	86
Celery	12.00	46	52	59	67
Corn(Sweet)	3.50	761	864	980	1,108
Cucumbers	5.00	140	136	154	174
Lettuce	8.00	157	178	202	228
Onions	10.00	651	738	837	946
Parsnips	8.00	16	18	20	23
Potatoes	8.00	11,855	13,443	15,249	17,236
Radishes	6.00	41	46	52	58
Tomatoes	6.00	374	424	481	543
Turnips (Rutabagas)	9.00	432	490	556	629
TOTAL		16,178	18,321	20,785	23,493

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[1] Alberta only.

[2] Asparagus and parsnip acreages estimated separately.

TABLE 26

ALBERTA ACREAGE REQUIRED TO FILL AVAILABLE MARKET (ON-SEASON) IN THE THREE WESTERN PROVINCES[1/]

Vegetable	Yield/ Acre tons	1966 acres	1971 acres	1976 acres	1981 acres
Asparagus[2/]	1.25	42	46	52	59
Beets	8.00	241	271	306	3,452
Cabbage	8.00	789	884	994	1,120
Carrots	10.00	1,880	2,097	2,349	2,652
Cauliflower	5.00	105	116	129	144
Celery	12.00	91	100	109	121
Corn(Sweet)	3.50	1,266	1,404	1,563	1,752
Cucumbers	5.00	142	160	180	203
Lettuce	8.00	316	350	388	435
Onions (Dry)	10.00	1,441	1,611	1,810	2,048
Parsnips	8.00	35	40	45	52
Potatoes	8.00	21,790	24,444	27,514	31,149
Radishes	6.00	58	64	72	81
Tomatoes	6.00	926	1,031	1,153	1,302
Turnips(Rutabagas)	9.00	842	945	1,063	1,205
TOTAL		29,964	33,563	37,728	43,123

[1/] Alberta, British Columbia and Saskatchewan.

[2/] Asparagus and parsnips acreages estimated separately.

Comment on Market Projections:

The preceding tables dealt first with projected requirements in tons of the various vegetables which Alberta could supply to the three western provinces separately, then in Table 24 in total.

Secondly, the required acreage was set out for Alberta's own supply in Table 25, then for the projected market (Table 26) for the three western provinces.

Referring to Tables 21 and 25 under the 1966 column, all tonnages and the matching acres exceed those of the latest recorded data (1965), on pages 7 and 8, except for potatoes, cucumbers and turnips. Exports and processing partly account for the minus figures.

TABLE 27

COMPARISONS BETWEEN 1966 PROJECTIONS AND LATEST RECORDED FIGURES[1/]

Alberta Acreage and Production

Vegetable	Acres			Tons		
	Recorded	Projected	Diff.	Recorded	Projected	Diff.
Cabbage	260	561	+ 301	1,735	4,484	+ 2,749
Carrots	450	858	+ 408	2,532	8,583	+ 6,051
Fresh Corn	740	761	+ 21	2,405	2,667	+ 262
Cucumbers	170	140	- 30	442	600	+ 158
Onions	400	651	+ 251	2,676	6,510	+ 3,834
Potatoes	23,000	11,855	-11,145	149,900	94,841	-55,059
Turnips (Rutabagas)	580	432	- 148	8,880	3,889	- 4,991

[1/] Projections refer to Alberta usage only.

The estimated yields per acre, in Tables 25 and 26, were taken as representing net production on irrigation because it was not practicable to allocate production between dryland and irrigated land. Thus, the projected acres may be slightly conservative.

The basis of calculation of the available market was the population per year and present per capita consumption. Several limitations should be noted. They are:

(a) A trend towards some substitution of frozen vegetables for fresh is evident.[1/] This will probably diminish the proportionate use of fresh vegetables in the long run. On the other hand, it may be expected that fresh vegetable plants may divert some fresh vegetables to that use.

(b) A trend away from home gardening is occurring in both city and country. Housewives are becoming more dependent on supermarket vegetables. However, home gardens still contribute part of the fresh vegetable diet, though this cannot be recorded statistically.

A substantially larger market is available for Alberta produce in the two neighboring provinces, and this market will continue to grow with the increases in population.

There is room for gradual increases in the home market for asparagus, beets, cabbage, carrots, cauliflower, celery, lettuce, onions, parsnips, radishes, tomatoes and turnips.

Particular attention should be paid by growers to the fact that there is a low rate of consumption for certain vegetables[2/] and that, therefore, a limited acreage is desirable.

In addition, certain vegetables such as field tomatoes and celery must be considered as in the "difficult to grow" classification in Alberta.

Up to this point, no assessment has been made of the potential market which might be realized for Alberta vegetables in the U.S.A. The proof of such a market can only be ascertained through trial shipments to test the acceptability of Alberta produce. Some reference will be made to the feasibility of exporting produce in terms of the added costs of transportation, duties and American exchange.

[1/] Figure 6, page 44.

[2/] Table 4, Appendix,

Part III - PRICES

Schedule 1 on page 56 shows the price ranges for the 15 major vegetables traded on Alberta markets. It also lists the common wholesale units.

Local prices, in season, reflect the wholesaler's experience in summer and fall conditions during which supply conditions are good in nearly all regions of Canada and the United States.

Imported produce prices apply to the period of the year in which produce must be secured outside of Alberta because of the shortage of local supplies. This is fall, winter and spring for leaf and other tender crops. It is late winter, spring and early summer for storable crops.

It is evident that import prices are higher than the local on-season prices. Alberta growers, therefore, should be interested in extending their own supply season in order to benefit from these higher prices. Suggestions to accelerate this are: (a) modernize storage facilities; (b) improve mechanical transplant machines; (c) adapt greenhouse production; (d) expand horticultural research for early maturing varieties.

Table 28 on page 58 is a development of Schedule 1. It translates prices from the customary wholesale language to a value per pound. These prices are intermediate rather than average because, in actual trade, far more produce is bought in the lower price range than in the higher.

Both tables are designed to reflect farm prices at wholesale delivery points in Edmonton in 1966. Prices at the farm vary widely because of location and indifferent knowledge of market prices. Published market reports rarely deal with the farm prices at wholesale points. It is an omission which puts the grower at a disadvantage.

As part of the analysis in production cost schedules, representative local prices were used to indicate gross receipts per acre. These prices are, generally, more conservative than import prices on pages 56 and 58, but were considered applicable as an initial basis for the vegetables Alberta may be expected to produce.

Schedule 1

DELIVERED PRICES - FARM TO WHOLESALE

Edmonton - 1966

Vegetable	Container		Price - Wholesale Units	
	Kind	Lbs.	Local (In-Seas.) $	Imported $
Asparagus	crate	30	5.50	6.00
Beets	mesh bag	50	2.00	3.00
Cabbage	mesh bag	50	1.85 - 2.25	3.20 - 5.50
Carrots	jute bag	50	1.50 - 2.00	-
	jumbo bag	50	2.15	2.15
	poly bag, 48-1's	50	3.25 - 4.35	3.25 - 4.35
	poly bag, 24-2's	50	3.00 - 4.10	3.00 - 4.10
	poly bag, 16-3's	50	2.75 - 3.90	2.75 - 3.90
Cauliflower	crate, 12's	25	2.00 - 2.25	-
	U.S. cello, 16's	25	-	3.60 - 4.20
Celery	crate	60	-	5.50 - 6.75
Corn (Sweet)	5 doz. jute sack	45-50	1.30 - 3.00	4.00 - 5.50
Cucumbers	hot house, 24's	40	3.50 - 4.00	3.50 - 4.00
	field	40	1.85 - 3.20	5.00 - 6.00
Lettuce	carton, 24's	40	2.40 - 3.00	3.00 - 6.50
Onions	mesh bag	50	2.00 - 2.50	2.50 - 7.00
Parsnips	mesh bag	50	2.50 - 3.50	3.50 - 6.50
	poly bag, 48-1's	50	5.00 - 6.00	5.00 - 6.00
Potatoes	jute sack	100	2.00 - 3.50	-
	jute sack	100	-	4.00 - 9.00
Radishes	wax cart. 5 doz. B's	25	3.00 - 4.00	4.00 - 5.00
	5 doz. poly wax cart.	25	-	4.40 - 5.50
Tomatoes	crate, Mat. Green	40	-	4.00 - 8.00
	lug, vine ripe	30	-	3.40 - 6.50
Turnips (Rutabagas)	sack, jute or poly	50	1.50 - 2.50	2.50 - 4.00

Price Fluctuations:

The preceding schedule gives evidence of rather wide changes in price levels. Such changes may be classified as:

(a) Short-term: In this case, sharp adjustments occur because of weather influence which may abruptly curtail harvesting operations over a wide supply area. A national buyer may buy out a short crop, thus removing supplies. Wholesale prices will first rise sharply and then may fall as quickly when supplies flow freely again.

(b) Intermediate: Price changes in this category may be classed as seasonal. They may be said to be seasonal trends. On the North American continent, price levels move from low in summer to high in winter.

(c) Long-term: Improved technologies tend to restrain price trends over the long term.

Increasing capital costs and higher labor expense tend to force prices upward. The removal of large tracts of land and the loss of a producing farm population also cause an upward trend in prices.

A very wide agricultural base in North America and a high rate of farm productivity due to technological improvements have combined to effect a very slow rate of climb in vegetable prices at the farm level. If prevailing urban standards of living continue to rise and vegetable production becomes concentrated in fewer and larger units, an increasing upward trend in prices may be expected.

Price Indexes:

Prices for goods and services in the non-agricultural sector of the economy are important to the farmer. Most of the vegetable growers' supplies are priced by the industrial sector. These prices have been rising and the value of the dollar falling. The prices of agricultural produce have not been keeping pace.1/

1/ Tables 7 to 10, Appendix.

TABLE 28

REPRESENTATIVE WHOLESALE PRICES FOR DELIVERED FARM PRODUCE

Edmonton - 1966 (Per Pound)[1/]

Vegetable	Container		Price Per Pound	
	Kind	Lbs.	Local (In-Seas.) ¢	Imported ¢
Asparagus	crate	30	19.0	20.0
Beets	mesh bag	50	4.0	6.0
Cabbage	mesh bag	50	4.0	8.0
Carrots	jute bag	50	3.5	-
	jumbo bag	50	4.5	4.5
	poly bag, 48-1's	50	7.5	7.5
	poly bag, 24-2's	50	7.0	7.0
	poly bag, 16-3's	50	6.6	6.6
Cauliflower	crate, 12's	25	8.5	-
	U.S. cello 16's	25	-	15.6
Celery	crate	60	-	10.2
Corn(Sweet)	5 doz. jute sack	45-50	3.5	9.5
Cucumbers	hot house, 24's	40	9.4	9.4
	field	40	6.3	13.7
Lettuce	carton, 24's	40	6.7	12.0
Onions	mesh bag	50	4.5	9.5
Parsnips	mesh bag	50	6.0	10.0
	poly bag, 48-1's	50	11.0	11.0
Potatoes	jute sack	100	2.7	-
	jute sack	100	-	6.5
Radish	wax cart. 5 doz. B's	25	14.0	18.0
	5 doz. poly, wax cart.	25	-	20.0
Tomatoes	crate, Mat. Green	40	-	15.0
	lug, vine ripe	30	-	16.5
Turnips (Rutabagas)	sack, jute or poly	50	4.0	6.5

[1/] Refer to Schedule 1.

TABLE 29

FARM VALUES FOR VEGETABLES[1]

1965

Vegetable	Manitoba $/lb.	Alberta $/lb.	B.C. $/lb.
Asparagus	0.179	*[2]	0.179
Beets	0.03	*	0.037
Cabbage	0.018	0.026	0.064
Carrots	0.024	0.020	0.046
Cauliflower	0.067	*	0.059
Celery	0.028	*	0.048
Cucumbers (Field)	0.053	0.058	0.040
Sweet Corn	0.036	0.018	0.059
Lettuce	0.042	*	0.050
Onions	0.027	0.042	0.045
Parsnips	*	*	0.062
Potatoes	0.0228	0.0225	0.0337
Tomatoes (Field)	0.073	*	0.068
Turnips (Rutabagas)	*	*	*

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[1] Crop and Seasonal Price Summaries, C.D.A. Values subject to revision.

[2] No values stated.

The values shown above may be compared with prices delivered to wholesale in Table 28. No condition of grading, washing or packaging was stated in the source bulletin for farm values. It should be noted that values do not refer to standardized grades. This is a universal weakness in establishing any system of "farm vegetable pricing". Either "shipping point" or "delivered to wholesale" prices appear to be the only adequate measures of farm commodity value.

SECTION V ORGANIZATIONAL STRUCTURE

(1) Grower Organization

In Alberta, vegetable grower organization, in the main, is limited to primary production. Representative groups follow:

- (a) The Alberta Potato Growers Association,
- (b) The Sugar Beet Growers Association,
- (c) The Cannery Crops Growers,
- (d) The Alberta Fresh Vegetable Growers Association,
- (e) Vegetable co-operatives

The first three groups have been in existence for many years and have large memberships with branches in different areas. The Alberta Potato Commission is supported by the Alberta Potato Growers Association and promotes the sale of Alberta potatoes. An Alberta Vegetable Marketing Board negotiates contracts on behalf of the Cannery Crop Growers. A Sugar Beet Growers negotiating committee represents the growers in yearly contract adjustments. The Alberta Fresh Vegetable Growers Association has only lately formed a provincial organization and do not yet have a unified voice. The sale of Alberta fresh vegetables, excluding potatoes, is as yet largely undertaken by individual growers. This characteristic procedure has not lent itself to the development of large scale ventures in fresh vegetable production. In large part, vegetable enterprises have been family operated undertakings, the scale of operations being limited to the number of family members available.

Co-operatives, which are a form of corporation, are still in the minority in the processing phase of the Alberta vegetable industry though some are functioning as grower co-operatives in production where contracts and prices are bargained for with buyers.

The co-operative movement among vegetable growers has entered a state in which the participants feel that packing, grading and processing functions should be integrated with production. This important concept involves the field of product conversion with all its financial and management problems.

Grower groups, as represented in co-operative societies and associations, have been giving consideration to involvement in the following functions:

- Extension of technical knowledge in both production and distribution.
- Marketing Commissions.
- Financing of production and processing facilities.
- National organization and communication.
- Integration of production and product transformation.
- Marketing practices and market expansion.

In summary, there is evidence that a break, away from the small market garden, is occurring. The organization of the New Fresh Vegetable Association indicates a recognition of the need for unified action among growers. Co-operative organizations have not been particularly active in production of vegetables. Growers co-operatives in the future will probably be concerned with integration of centralized storage, packing and shipping in their operations. It is reasonable to expect that numerous individual vegetable growers will continue their operations in the vicinity of the cities to serve institutional needs and special customers.

(2) Marketing Channels

The packing, processing and distributing functions of the vegetable industry are performed by the following:

(a) Grower-shippers:

One large potato plant, owned by growers, carries on all functions short of retailing. A few other large potato growers operate similarly on their own farms.

Two large fresh vegetable growers store and pack vegetables for either the wholesale or retail trade. Other small operators emulate these functions but with limited output.

A greenhouse operator's co-operative has set up a centralized operation for grading and shipping cucumbers and tomatoes.

(b) Buyer-shippers:

Several businesses in this category contract for delivery or buy produce for packing and shipping on their own account.

(c) Vegetable Processors:

Three plants, subsidiary to national chains, regularly contract a wide variety of vegetables with growers for their principals and for the general wholesale-retail trade.

(d) Commercial and Institutional Trade:

Alberta cafes, hotels, restaurants and other private and public institutions buy considerable amounts of fresh vegetables from market gardeners. They buy in bulk and are not concerned with the strict grade requirements of the retail trade.

(e) Wholesalers:

Produce wholesalers buy Alberta vegetables in bulk and regrade and pack them in consumer packs. Their preference is for prepackaged vegetables. The wholesalers hire broker services mainly for fruit and vegetable imports from other provinces and the U.S.A.

(f) Retailers:

The food retail chains dominate the merchandising of vegetables. Some of them have affiliated or integrated wholesale arms to secure their produce. They buy and sell far more vegetables than do independent stores and, by their purchasing policies, exert considerable influence on the progress of local production.

Alberta wholesale representatives have encouraged vegetable production in Alberta, and assisted in modernization. Traditionally, wholesalers and retailers concern themselves with sources of supply which, for a number of reasons, are advantageous to themselves. They are not limited to local markets or production areas. Having found satisfactory sources, they tend to maintain those connections and to be critical of the local potential. This probably has been a factor in restraining the size of the production units in Alberta.

If Alberta fresh vegetable growers and shippers increase their ability to compete in price and provide continuity of product in the same quality most wholesalers may be expected to deal with the growers.

(3) Marketing Authorities Under Legislation

Vegetable growers may avail themselves of Provincial legislation in the marketing of their products. In 1955 an Act, called the Marketing of Agricultural Products Act, was passed for the purpose of providing for the promotion, control and regulation of the marketing of certain agricultural products within Alberta. This Act enabled producers to establish marketing boards. The Act was amended in 1965 to provide for the establishment of marketing commissions. Key differences between boards and commissions are as follows:

(a) Producer Marketing Boards:

Members of a board are producers who are elected by producers. Boards may have the authority to negotiate with the trade, prices to be paid producers, to set prices to be paid, or to sell the product for producers through a single sales agency. Boards may also have the authority to establish marketing quotas in attempting to achieve orderly marketing.

(b) Marketing Commissions:

Members of a commission may be all producers or some combination of producers and trade representatives appointed by the Lieutenant Governor in Council. Commissions may establish quality standards and carry out advertising, educational and research programs, or they may establish a sales agency through which producers can market their produce if they so desire. However, all the products marketed, whether through the commission or direct to buyers, would pay the same fee for marketing. Commissions are not allowed to use marketing quotas.

The operation of any board or commission established under the Act is supervised by a corporation called the Agricultural Products Marketing Council. The Council is responsible for the administration of the Act on behalf of the Minister of Agriculture.

At present there is an Alberta Vegetable Marketing Board, established in 1958, for the use of growers who produce vegetables for processing. The main function of this board is to negotiate with the processor the prices to be paid producers, as well as terms of contract.

A Potato Commission was set up in 1966 for the main purpose of advertizing and promoting Alberta grown potatoes. Growers pay a fee of five cents per hundredweight on all potatoes marketed to finance the Commission. They hope to find new market areas for potatoes.

Summary:

Vegetable growers are showing an increasing interest in boards and commissions in their search for an improved and more orderly marketing system.

SECTION VI CENTRALIZATION

"Centralization", in this report, refers to the concentration of facilities for assembling, storing, preparation and shipping of fresh vegetable produce. It concerns the use of these facilities by a number of growers as opposed to use by an individual.

The concept of centralization has been widely discussed in recent years by growers in search of the best means of standardizing quality, providing continuity of supply, stabilizing prices and avoiding duplication of expensive facilities on farms.

It has not been proven, in industry, that centralization for all storable vegetables is universally practicable and economic. The potato industry is the first to attempt centralization in Alberta, and because of the ease of co-ordinating farm and centralization storage, it has initially shown promise. As for other vegetables, centralized storage, on a small scale, has been demonstrated to be physically possible at the Brooks Horticultural Station.

(1) The Individual

Before examining centralization in detail, it should be emphasized that there are two or three individual growers in Alberta who have financed modern plants of significant size on their own farms. They have been able to supply high quality packaged produce for prolonged periods to the major markets in Alberta.

These innovators have adapted their methods of growing, storing and packaging to conform to the requirements of the retail market. In putting out consumer packs, they have advanced a step further into the market place. This departure required complete redesigning, retooling and refinancing of their facilities. The results have been encouraging to them. They can be expected to operate regionally within the provincial field.

An individual operator with exceptional energy and drive may be able to maintain the necessary market connections and to satisfy market requirements. However, it is difficult for one man to adequately direct production of the crop, storage and preparation, and serve the wider marketing areas. This latter aspect is the one in which centralized operations have an important advantage over the individual grower-shipper.

(2) The Group

Centralization is basically concerned with group action, and the benefits which can be derived from such an association. In the fresh vegetable industry, small operators alone find that elaborate grading, sizing, packaging and temperature control facilities are beyond their financial means. If they decide to associate in financing a centralized facility and in hiring a capable staff to operate the plant, they can devote themselves to their main undertaking, which is production.

While there may be problems in delivery, storage and handling the production of member growers at a central location, there are some advantages. The most important advantage is the capacity to find and keep markets.

This function is one which the plant manager must be able to perform. He should be able to keep the pipeline open between the growers and the buyers. In his position, he must do that better than any participating individual growers.

Further advantages can be realized through a central facility because of:

(a) Impersonal grading.
(b) Better washing and packaging.
(c) More efficient use of equipment because of greater volume of output.
(d) Skilled full-time personnel.
(e) Better assurance of vegetable supplies.
(f) Longer-term financing.
(g) Prestige of a brand name.
(h) Wider variety of products.
(i) Better market negotiation ability.

(3) Forms of Ownership of Integrated Enterprises

There are three general forms of ownership of a grower-shipper vegetable enterprise. They are:

(a) A single proprietorship, in which one owner operates the combined business of growing, storing, packing and shipping.

(b) A private company, in which any group of individuals associate their resources to perform the above functions for themselves, or for the public at large.

(c) A co-operative organization, which combines the resources of its members to centralize the facilities of assembly, preparation and shipping, and does business as an incorporated co-operative.

We have several examples of each kind in Alberta. They each can be effective and economic in disposition of root crops and certain storable leaf crops.

Single Ownership

A single capable owner-operator can make fast decisions and has the personal incentive to strive for success. An operator who deals in root-crops for the fresh market may require a plant and equipment investment with a new value of $100,000.00. This accommodates temperature and humidity control, palletized storage and preparation equipment to handle a business of 600 to 1,000 tons of poly-bagged and bulk output.

A planted acreage of 100 acres and up is necessary to achieve this output. Additional land is required to permit a rotation of crops. Land and field equipment investment is in addition to plant investment.

A single owner-operator who grows, stores and prepares potatoes for the fresh market requires less plant investment than the fresh vegetable producer. In order to handle a net output of 1,000 tons (largely in 100 pound sacks) from approximately 200 acres, plant and equipment investment (new value) may be close to $35,000.00. This includes a modern wash house and equipment, exclusive of a rotary bagger.

Corporate Ownership:

A private company, which is not largely owned by vegetable growers, encounters a significant hazard as there is less assurance of adequate supplies from growers. As a result, such enterprises base their investment plans on the handling of the "most available crop", which, in Alberta, is potatoes. The usual intention is to add plant facilities for other fresh vegetables when conditions warrant.

Co-operative Ownership:

A co-operative organization of fresh vegetables growers, which invests in central assembly, storing and packing facilities, has a ready-made source of supply. Its members have an obligation to provide their own plant with the necessary produce.

In common with large private concerns, the co-operatives are faced with obtaining able management and optimum output. Plant investment may range from $100,000 to $500,000 depending on the desired output. Large potato packing plants, which have a potential output of 20,000 to 30,000 tons per year, require an investment of $250,000 in plant and $100,000 in equipment. The cost of operation for one year, exclusive of raw product purchases, may approach $250,000. Initial working capital requirements may exceed $70,000.

Plant Establishment and Investment Considerations:

The location, construction, financing and operation of large vegetable packing plants are problems of considerable magnitude to growers.

Location near a substantial market is always preferable, but plants must be constructed in the production areas in order to be closely associated with ready sources of supply. Maximum hauling distance should be about 20 miles. Small towns are often good sites, where utilities, labor and transportation lines are available.

Construction is sometimes a problem, mainly from the planning aspect. In Alberta, very few firms have had experience in the design and operation of temperature and humidity controlled vegetable storage. On occasion, enthusiastic promoters plan on a grand scale without due recognition of production and market capacity. Plant blue prints, which allow for subsequent expansion, should be the basis of preliminary study.

Investments in fresh vegetable plants, of the size and nature necessary to compete in modern markets, should be of long term nature. Certain aspects of company organizations and procurement policy have a bearing on the readiness of investors to participate. Various choices in organizations are listed as follows:

(a) Ownership by a co-operative through partial government financing through loans.

(b) Private ownership with contracts to growers for purchase of produce.

(c) Private ownership and negotiated custom charges for storage, preparation amd marketing.

(d) Private or crown ownership with a long-term lease to growers.

(e) Private or crown ownership with a lease-purchase agreement with grower co-operatives.

The first three forms of ownership and operation are the most common. The last two are not widely used as yet. Some potato associations in the U.S.A. lease individual storage space to their members, but such arrangements for other fresh vegetable storage, though they may exist, are not known to us. Canadian winter conditions may justify an adaptation of lease arrangements.

Co-operatives may receive more effective support from growers in these aspects from year to year because of member loyalty. Corporate ownership does not experience an equal degree of loyalty. However, in the U.S.A., independent shippers habitually buy from independent vegetable growers. In Alberta, private ownership of centralized plant facilities may prove to be satisfactory if the prospect of grower participation is assured.

(4) Contracts

Contract arrangements for shipment of vegetables to processors are common in the cannery field; but deliveries of fresh vegetables by growers and shippers to customers are traditionally made on short-term orders. Generally speaking, written contracts are more satisfactory than verbal agreements between growers and shippers.

Initial payments to growers on delivery to the plant is a common procedure. There are often subsidiary agreements as to supplying seed and fertilizer. The initial payment varies from 50 to 60% of the value of the produce, the remainder is paid within a specified period. Co-operatives have payment plans of similar nature, with some further consideration to dividend payments.

Written contracts are advisable in centralized undertakings such as:

(a) An integrated Co-operative grower-shipper enterprise:

In this case, the growers are obligated to deliver the produce to the packing or storage plant under the consititution of the Co-operative.

(b) A commercial packing-shipping plant which deals with a grower Co-operative:

A firm contract between the plant owner and the Co-operative, to deliver and to receive, should be undertaken.

(c) A commercial packing-shipping plant which deals with individual growers on a custom basis:

Assuming that all essential plant facilities, including winter storage are provided by the operator, an extended term commitment in the form of a lease to the grower for specified storage space and service might be most equitable to both parties.

This arrangement relieves the grower from investing in expensive storage facilities and ensures modern storage conditions for his produce. The plant operator secures a reasonable guarantee of supply.

The capacity of the plant operator to market the produce and his authority to do so are important aspects of this arrangement.

(5) Fresh Vegetable Storage

The Importance of Refrigerated Storage:

One of the important considerations in vegetable plant construction is storage. While such crops as lettuce, asparagus, cauliflower, celery, and radish are commonly sent to their destinations with initial and transit cooling only, root-crops, on the other hand, must often be stored for several months before marketing conditions warrant their sale. Root-house storage space can be made effective for maintaining quality in potatoes, but it cannot prevent deterioration in other vegetables.

The provision of long-term storage involves considerable expenditure in refrigerating equipment, storage space and extra handling. These conditions have to be faced in Alberta because of the one-crop per year characteristic of production. A decision, therefore, must be made as to the financing and construction of storage facilities in addition to the normal working area and working equipment requirements.

Term Storage:

(a) Temporary storage - This is the kind of storage which takes place en route from the shipper to the consumer. The produce may be held for several days at the wholesaler's before reaching the consumer's table. Tomatoes, radishes, asparagus, spinach, parsley and lettuce are examples of such produce.

(b) Long-term storage - This is interpreted as winter storage. Fresh vegetables will retain excellent quality and flavor for three to eight months under controlled temperature and humidity in this storage. Carrots, parsnips, turnips, beets, onions, potatoes and cabbage are examples of vegetables commonly stored for long periods of time. A table of desired storage temperatures and humidities is shown on page 73.

Though both kinds of storage are essential, long-term storage must be practised in Alberta if a sound local industry is to endure. Without it there cannot be the continuity of supply which is required by the trade, The storage element is of great importance in any form of proprietorship. Storage for potatoes, in Alberta, can be undertaken in farm roothouses. Thus, central packing plants do not have to store the whole crop. They may store 2,000 to 3,000 tons in the plant and call for farm supplies before they run out.

Centralized storage is somewhat different for other vegetables. Roothouse storage on the farm cannot be relied upon to preserve market quality. Horticulturists advise temperature and humidity controlled storage immediately after harvest. This implies that the grower be large enough to invest up to $100,000 in plant and equipment, or that otherwise, storage accommodation be supplied for the crop at a central plant. Potatoes require storage conditions differing from those of many other vegetalbes. A division of storage may be necessary to provide for the range in temperature requirements among vegetables. This compartmentalization leads to higher investment costs for storage when a variety of crops must be handled. Refrigerated storage space costs range from $12.00 to $18.00 per square foot. Other plant space costs $6.00 to $8.00 per square foot. The costs refer to insulated concrete block construction of permanent nature. Insulated wooden-panel construction is cheaper but with shorter life.

Different vegetables require different storage temperatures,[1/] and such temperatures range from 32° to 55° F. and relative humidities range from 70 to 98%. One vegetable crop - onions - often has to be artificially dried. Skilled operation is required to protect stored supplies from loss by deterioration.

The storage of the total season's output in a central location becomes an expensive undertaking. Much of the space may be used only once per year unless cropping programs include vegetables which may be delivered to the plant at different times - or unless auxiliary enterprises such as reconstituting vegetables or fruit juices, or other processing, are undertaken.

[1/] Table 30, page 73.

Table 30

STORAGE REQUIREMENTS AND PROPERTIES OF PERISHABLE PRODUCTS

Commodity	Storage Temp, F	Relative Humidity %	Approximate Storage Life	Water Content %	Highest Freezing Point, F	Specific Heat Above Freezing	Specific Heat Below Freezing
Beans (Green or snap)	45	85-90	8-10 days	88.9	30.7	0.91	0.47
Lima	32-40	85-90	10-15 days	66.5	31.0	0.73	0.40
Beets, Bunched	32	90-95	10-14 days	-	31.3	-	-
, Topped	32	90-95	1- 3 mos.	87.6	30.1	0.90	0.46
Broccoli, sprouting	32	90-95	7-10 days	89.9	30.9	0.92	0.47
Brussels Sprouts	32	90-95	3- 4 wks.	84.9	30.5	0.88	0.46
Cabbage, late	32	90-95	3- 4 mos.	92.4	30.4	0.94	0.47
Carrots, bunch	32	90-95	10-50 days	-	-	-	-
, prepackaged	32	80-90	3- 4 wks.	-	29.5	-	-
, topped	32	90-95	4- 6 mos.	88.2	29.5	0.90	0.46
Cauliflower	32	90-95	2- 3 mos.	91.7	30.6	0.93	0.47
Celery	31-32	90-95	2- 4 mos.	93.7	31.1	0.95	0.48
Corn, sweet	31-32	85-90	4-10 days	73.9	30.9	0.79	0.42
Cucumbers	45-50	90-95	10-14 days	96.1	31.1	0.97	0.49
Lettuce	32	90-95	3- 4 wks.	94.8	31.7	0.96	0.48
Onions and Onion sets	32	70-75	6- 8 mos.	87.5	30.6	0.90	0.46
Parsnips	32	90-95	2- 6 mos.	78.6	30.4	0.81	0.46
Peas, green	32	85-90	1- 2 wks.	74.3	30.9	0.79	0.42
Potatoes, early crop	50-55	85-90	5- 8 [1]	-	30.9	-	-
, late crop	38-50	85-90		77.8	30.9	0.82	0.43
Radishes, spring, bunched or prepackaged	32	90-95	10 days	93.6	30.7	0.95	0.48
, winter	32	90-95	2- 4 mos.	93.6	-	0.95	0.48
Rutabagas	32	90-95	2- 8 mos.	89.1	30.1	0.91	0.47
Tomatoes, mature green	55-70	85-90	2- 5 mos.	94.7	31.0	0.95	0.48
, ripe	32	85-90	7 days	94.1	31.1	0.95	0.48
Turnips, roots	32	90-95	4- 5 mos.	90.9	30.1	0.93	0.47

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[1] A new climate control storage system, which can increase the effective storage life of potatoes intended for processing, has been developed by the University of Minnesota. With the new system, the storage time can be extended to 11 months.

Summary: Ownership, Operating Policy and Plant Use

There is room for the individual operator to integrate in vegetable growing, preparation and marketing in Alberta. This has been demonstrated by several such modern operations in the province.

There appears to be a need for some centralization where capable growers, not wishing to duplicate costly investment in plant and equipment, can continue to grow the vegetables, and can unite to provide means for central distribution. By this means, a larger market area can be reached and held than would be the case with isolated individual grower-shippers.

While an individual grower-shipper plans his own operations for optimum production, and attempts to carry his plans through, centralized plants require the co-operation of numerous growers. Thus, plant procurement policies must be sound in order to secure necessary financing and to achieve production objectives.

If centralized storage is to accommodate the total crop, there must be receiving and handling facilities adequate to accept the heavy harvest-time deliveries. There must be sufficient storage space for the total crop. As storage space is emptied, some means should be devised for its economic use during the rest of the year.

Planners, in the fresh vegetable industry, should give considerable thought to the disposal of surplus vegetables or culls in some auxiliary processing operation in or near the plant. A very large wastage commonly occurs in fresh vegetable plants. Plant income may be considerably increased by processing this wastage into products such as potato chips, french fries, vegetable juices, granules or soups.

(6) Financing

Most fresh vegetable enterprises in Alberta use some short term financing. Centralization of assembly and packaging facilities require financing of both short and long term character to support heavy plant investment, raw product purchases, and the operating and storage expenditures involved in the orderly distribution of produce throughout the year.

Depending upon the size of the business and the variety of products, plant investment could range from $50,000 to $500,000 or more.

There are sources of financing which are set up to service businesses in this investment range. The most important may be listed as follows:

(a) Commercial Financing Institutions
    i. Chartered Banks
    ii. Commercial Investment and Realty Corporations

(b) Government
    i. Farm Credit Corporation
    ii. Industrial Development Bank
    iii. Alberta Commercial Corporation
    iv. Co-operative Activities and Credit Union Branch

(c) Others
    i. Federal Warehousing Enactment

The type of loan, the duration and the interest rate have a relationship to the expected use, as for (a) land and buildings, (b) machinery, (c) the purchase of inventory, and (d) working capital requirements.

The conditions required for securing the loan, the amount of principal required and duration of the loan differ considerably among the foregoing agencies. Certain of them deal in short term loans. Others service intermediate term loans of up to ten years. Others engage in long term loans up to 40 years. Interest rates range from 5 to 9% depending on the service.

Commercial Financing Institutions:

New banking policies are in development following recent Federal banking legislation. The extent to which Banks will participate in long term financing is yet to be established. They already provide short term loans.

There are several national investment and realty corporations which finance agricultural product industries, usually on the basis of participating investors. These corporations are in a position to provide substantial finances for the establishment and operation of potentially sound industrial undertakings.

Provincial Government Agencies:

The provincial government agencies are represented by the Alberta Commercial Corp. and the Co-operative Activities and Credit Union Branch. They are usually limited in the total funds available for lending in an annual period, and they require a specified minimum investment by the borrower. They also require the prospective borrower to submit supporting data outlining the economic basis for the venture. Among these agencies, the Co-operative Activities Branch considers loans only to non-profit organizations.

These Crown corporations are set up to serve basically sound manufacturing firms and commercial agricultural undertakings of a similar nature which are unable to secure sufficient financial assistance elsewhere. Each of the foregoing agencies is capable of supplying valuable financial service within its terms of reference. Both individual and corporate enterprises are included in the lending program of these government institutions.

Federal Agencies:

The Industrial Development Bank is a Crown Corporation which is empowered to finance small and medium - size Canadian businesses where the necessary financing is not available from other sources on reasonable terms. Most of the loans are for amounts of $100,000 or less. They have branches in all major cities in Canada. Statements of the proposed investment and expected earnings are required from the prospective borrower with his application for a loan. Included in the services of the I.D.B. is the provision of working capital.

The Farm Credit Corporation provides financing for farm enterprises in respect to land, buildings, machinery and livestock. The maximum loan limit may be somewhat low for financing an individual vegetable plant.

Others:

- Federal Warehousing Enactment -

In 1967, a revision of a former enactment was set up under the title above. Generally, grants-in-assistance under this act will be made to grower organizations wishing to build vegetable and fruit storage, and packing warehouses. It is probable that provincial governments will endorse this program in their respective provinces.

There are further sources in the commercial and government spheres which finance traditional farm enterprises. Individual and co-operative farm machinery purchases, and general farm and home financing are included in this field.

Schedule 2

Example: Capitalization

Storage and Packing Plant
For Carrots, Turnips, Cabbage, Etc.

(Storage Capacity 1,000 Tons)[1]

Investment in:

Building and site:	
Refrigeration & Storage Space @ $12/sq. ft. (80' x 80') .	$ 76,800
Working Area & Other Space @ $6/sq. ft. (48' x 64') . .	18,000
Equipment - plant, mechanical and electrical	15,000
Pallet Boxes @ $16.00	24,000
Automotive	5,000
TOTAL	$ 138,800

Schedule 3

Example: Operating Account (176 days per year) - Irrigation (Carrots)

Sales: 1,000 T. @ $120/ton 1#, 2#, 3#, 50#[2]	$ 120,000
Splits, oversize @ $60/ton	---
TOTAL	120,000
Expenses:	
Carrots - 1,000 T. (rough grade) @ $30/ton[3]	30,000
Containers	12,000
Administration - personnel (2)	15,000
Plant labor - personnel (10)	19,000
Overhead - tel., power, water, repairs, ins.	4,000
- depreciation	7,000
Short term debt @ 7%	200
Amortization of plant investment, 20 yrs. @ 6%	12,000
TOTAL	$ 99,200
NET - Before Income and Property Tax	$ 20,800

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[1] Larger storage capacity than Figure 7.

[2] The output consists of 1 lb., 2 lb., 3 lb. poly bags and 50 lb. jumbos and 50 lb. institutional sizes.

[3] On basis of produce above washed into plant. Plant equipment could handle more than storage capacity.

Figure 7: Floor Plan - Carrot Storage and Packing Plant

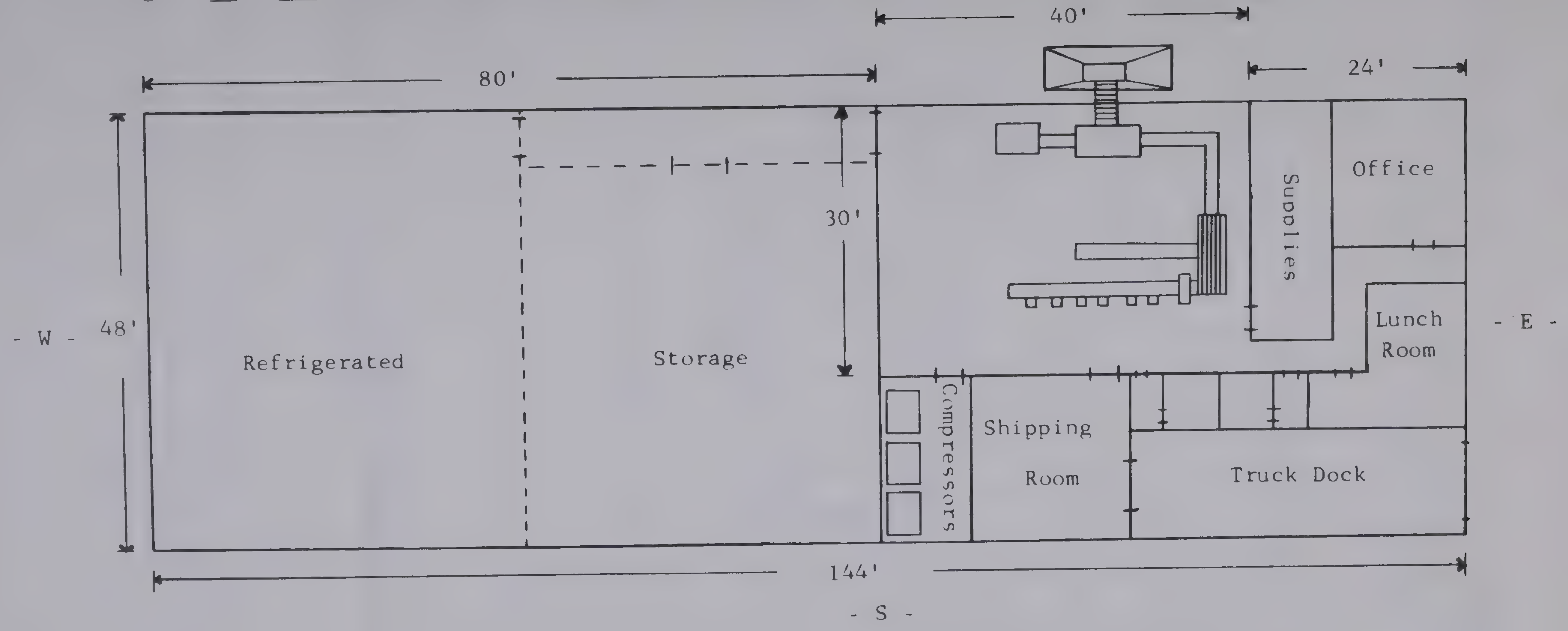

Figure 7 shows the plant layout for 500 to 600 tons of root crops stored in pallet boxes to the height of 12 feet A clear ceiling of 16 feet would accommodate another 90 tons. An additional height of 6 feet is necessary for forced air circulation. A combination of conventional refrigeration and water cooling is currently being favored in this type of storage.

The "working area", in this design, is large enough to hold additional equipment if future expansion of output and storage is contemplated The expansion of the storage area would probably occur on the south side.

Schedule 4

Example: Capitalization

Potato Storage and Packing Plant[1]

(15,000 - 20,000 Tons Output)[2]

Investment in:

Building and site @ $6.00 per sq. ft.	$ 190,000
Plant Equipment	70,000
Electrical	20,000
Refrigeration	12,000
Automotive	8,000
TOTAL	$ 300,000

Schedule 5

Example: Operating Account (220 days per year) - Irrigation

Sales - 15,000 T. @ $50/ton - #1's, 2's, Bakers[3]	$ 750,000
Culls and Utility Potatoes[4]	---
Expenses:	
Potatoes (rough grade) @ $33/ton	495,000
Supplies - containers, disinfectants, cleaners	60,000
Administration & Sales Expenses - personnel (4)	35,000
Plant Labor - personnel (20)	60,000
Overhead - tel., power, water, repairs, insurance	10,000
- depreciation	13,000
Short Term Debt @ 7%	1,000
Amortization of plant investment, 20 yrs. @ 6%	25,000
TOTAL	$ 699,000
NET - Before Income and Property Taxes	$ 51,000

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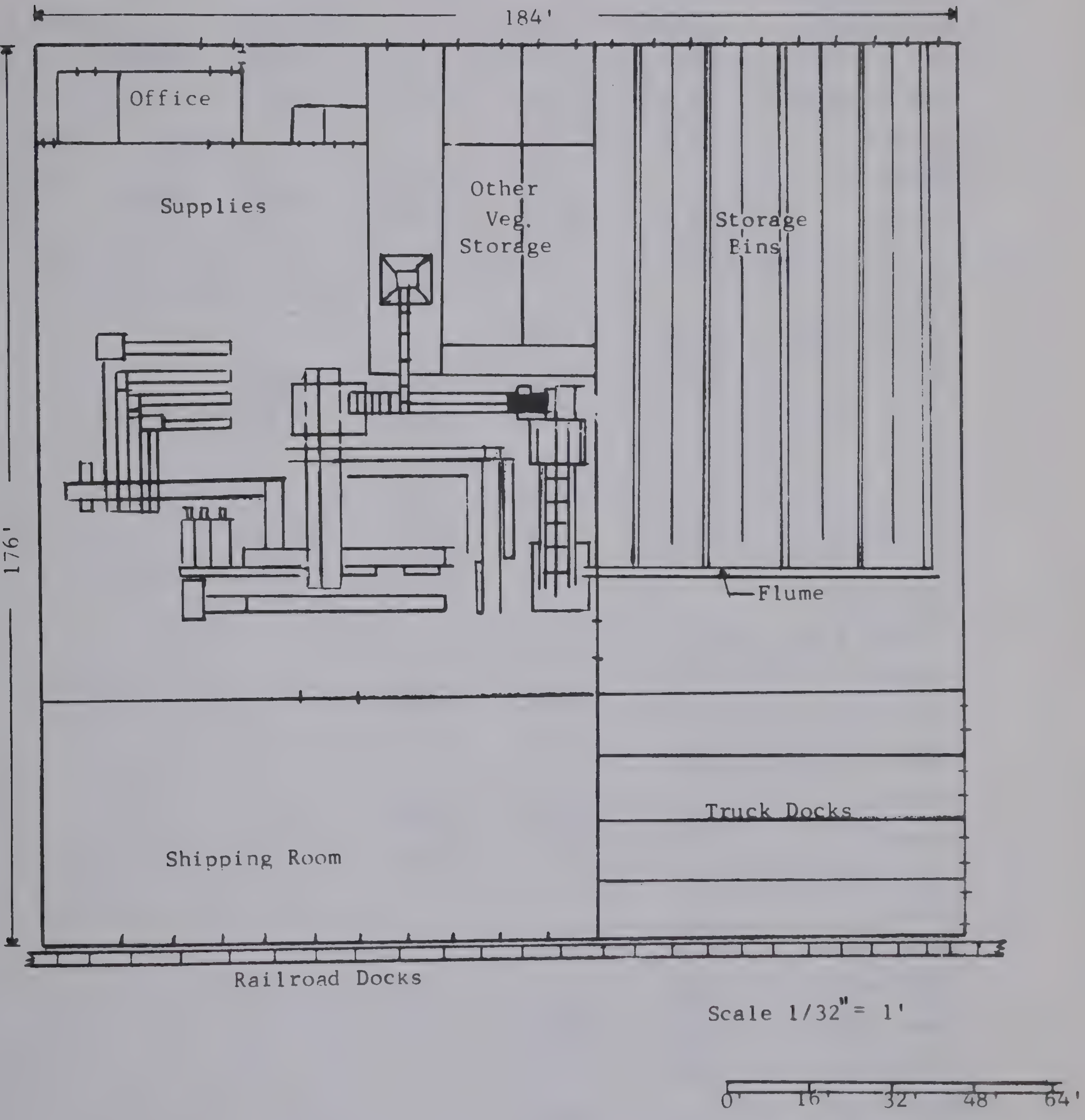
[1] Page 81.

[2] Storage space - 3,000 tons.

[3] The proportionate sales of #1's, #2's and Bakers would cause the sales value per ton to fluctuate around $2.50 per cwt.

[4] If bin-run deliveries are accepted, the "culls" are valued at the cost of grading them out. Utility potatoes - rough and outsize - may be contracted to a processing company.

Figure 8 : Floor Plan - Potato Storage and Packing Plant



Schedule 6 COMMERCIAL COSTS IN VEGETABLE PACKING, WASHING & GRADING

Cost Basis - Dollars per ton in various container sizes.

Potatoes

Packout:	100 lb.	5 lb.	10 lb.	15 lb.	0 lb.	25 lb.
	$	$	$	$	$	$
Wash, Grade	4.50	4.50	4.50	4.50	4.50	4.50
Sacks	4.00					
Pack		24.00	16.00	14.00	10.00	9.00
Total	8.50	28.50	20.50	18.50	14.50	13.50

. . . .

Carrots

Wash, Grade Bin-run - $ 8.00[1]

Packout:[2]	50 lb.	1 lb.	2 lb.	3 lb.
Wash, Grade	10.00	10.00	10.00	10.00
Sacks	5.60			
Pack		80.00	60.00	47.00
Total	15.60	90.00	70.00	57.00

. . . .

Onions

Grade, Size Bin-run - $ 10.00

Packout:	50 lb.	3 lb.	5 lb.
Grade, Size	12.00	12.00	12.00
Sacks	6.00		
Pack		47.00	36.00
Total	18.00	59.00	43.00

. . . .

Beets

Wash, Grade Bin-run - $ 8.00

Packout:	50 lb.	2 lb.
Wash, Grade	10.00	10.00
Sacks	5.60	
Pack		60.00
Total	15.60	70.00

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[1] Bin-run basis per ton.

[2] Charged on net grade-out.

Schedule 6 Con't.

Turnips		
Grade, Wash	Bin-run - $ 8.00	
Packout:	50 lbs.	
Grade, Wash	10.00	
Sacks	6.20	
Pack		
Total	16.20	

Parsnips		
Grade, Wash	Bin-run - $ 20.00	
Packout:	50 lb.	1 lb.
Grade, wash	24.00	24.00
Sacks	5.60	
Pack		80.00
	29.60	104.00

. . . .

NOTE: The costs per ton in the preceding schedule do not include selling or administrative costs.

Schedule 7 RECENT CHARGES BY POTATO PACKER-SHIPPERS

A. The following comparative charges are those assessed for receiving, washing, grading, supplying sacks, marketing, loading car or truck, bookkeeping, remitting, etc.

B. California-Arizona

Complete service as in "A" - $0.83 per cwt. or $16.60 per ton. No returns to growers for culls which the packing house keeps for grading . . . . $ 16.60/ton

* Source - Potato Manual, California Growers Association, Sept. 1, 1961.

C. Washington State

Receiving, washing, grading, etc.	$ 6.00/ton	
Sacks, twine, etc.	5.00/ton	
Sales charges	4.00/ton	
Promotion charges	0.40/ton	. . . $ 15.40/ton

* Source - Washington Growers Assoc., March 9, 1962.

D. Colorado

Receiving, grading, packing, etc. . . . . $ 18.00/ton

*Source - Tabb Potato Service, March 8, 1962.

E. Idaho

Complete service	$ 14.00	
Promotion	0.40	. . . . . $ 14.40/ton

Packers keep culls for grading out.
* Source - Tabb Potato Report, April 5, 1962.

F. Alberta - Growers do own packing and washing.

Sacks	$ 3.60	
Sales costs	5.00	. . . . . $ 8.60/ton

Growers absorb labor costs, grading, washing, sacking, shipping - cost unknown, labor unknown.

G. B.C. Coast Vegetable Co-operative Association

Receiving, grading, washing, sizing	$ 4.50/ton	
Marketing, bookkeeping, etc.	4.50/ton	
Sacks, twine, etc.	3.40/ton	$ 12.40

Culls - grading charge of $3.00/ton with culls going back to farm or sold to grower's account - culls belong to growers. Promotion and advertising included in charges.

SUMMARY OF CHARGES

For complete and similar service, the net cost to producers for potatoes delivered plant:

* California - Arizona	$ 16.60 per ton
* Washinton State	15.40 per ton
* Colorado	18.00 per ton
* Idaho	14.40 per ton
B.C. Coast Vegetable Co-op	$ 10.45 per ton

* Note: Culls retained by packers and no credit to growers.

Alberta Potato Commission Fees

Regulated	Fee					
Ungraded	$0.05	-	.15 x 5	=	$0.0425/cwt.	$ 0.85/ton
Culls & Smalls	$0.05	-	.50 x 5	=	$0.025 /cwt.	$ 0.50/ton
No. 1's & 2's	$0.05	-		=	$0.05 /cwt.	$ 1.00/ton

The above license fees are payable where the potatoes are delivered into primary channels of sale whether for use as fresh, seed or processing or other purposes.

(7) Plant Requirements

Location:

Location of the plant should be in the producing area and should be on either a main highway or railway line leading to markets. If possible, the plant should have loading and unloading facilities located with a view to the best use of receiving and delivering requirements. A location near a small town can often assure a ready supply of labor.

Site:

The site should be chosen adjacent to satisfactory utility sources such as water, light, heat and electric power. The site should be larger than the proposed building to allow for easier manoeuvreability of truck trailers and for possible expansion in the future. Soil characteristics should be tested in order to certify a sound base for footings and foundations.

Plants may range from areas of 7,000 sq. ft., in the case of small individual units, up to 60,000 sq. ft. for large multi-vegetable plants. The lower floor area can be adequate for a satisfactory commercial venture involving the storing and packing of 500 to 600 tons of root crops. A plant with the larger floor area should have an output of at least 50,000 tons. Several designs are shown on the following pages.

Plant Layout:

The overall objective in plant layout is to achieve a smooth and uninterrupted movement of produce through all the sequences of operation. The functions to be considered in planning this movement of produce are:

(a) receiving,
(b) preparation,
(c) storing,
(d) loading.

In Alberta, winter storage is important in all vegetable packing plants. Potatoes are relatively easy to store before shipment by setting temperature and humidity controls in the storage room. Other vegetables require different temperatures and humidities and hence, separate storage rooms. While this cannot be a straight through procedure, such as is usually the case in the U.S.A., these storage facilities should be arranged so that the produce proceeds by the most direct lines to shipping rooms and loading docks.

Utilization of Space

A vertical minimum clearance is important. Ducts, pipes and overhead obstructions should be placed so that there is no interference with the movement of the produce in any part of the plant. Care must be taken to limit clearance to the practical stacking height. Excess ceiling height represents useless space. Two-story operation is sometimes accomplished by using the basement for storage and the main floor for all other operations, though a single level is preferable.

Direct Flow of Commodities

Grading equipment, aisles, doors and storage areas should be located so that the shortest possible distances are utilized.

Flexibility in the Use of Space

Seasonal changes in the availability of produce result in different handling procedures. In this connection, alternate use of storage space should be made. Dead space should be reduced to a minimum.

Office Space

Office space should be planned to fully accommodate the staff's requirements to carry on every day correspondence and business functions. The location should be away from the noise and other interference from plant operations. Wash room, cloak room and lunch room facilities should be available for all staff members.

Minimum Supervision

Supervision of operations can be greatly facilitated from a central position above the operating floor from which all operations may be observed. The location of controls for temperature, humidity and equipment operation should be in safe and convenient positions.

Future Expansion:

Construction plans may necessarily be limited to a 10 year period because of restrictions in financing or in the existing area of supply. Additional construction may be anticipated at the end of that time. Further construction may be designed to accommodate a larger volume of produce, a greater variety of produce, or additional by-product processes. In such plans, allowance should be made to contemplate (a) construction on both sides of trackage, (b) to allow clearance for expanded storage space, (c) to permit the use of a water-flume system for moving produce to the central grading and packing or by-product areas.

Material-Handling Equipment:

Modern vegetable handling equipment is designed for use on hard level surfaces. They may be hand trucks or motorized forklifts, etc. Pallets and pallet boxes are lifted, stacked and transported by these machines. The carrying capacity and vertical lift must be adequate to suit the volume and nature of the produce to be moved. Two other means of moving produce are the mechanical belt or chain and the water-flume. The latter method is becoming widely used in preliminary handling of potatoes, carrots, beets, turnips, parsnips and other root crops.

(8) Labor

The labor supply for a vegetable plant is usually found to consist of local residents. The heaviest labor demand occurs during the harvesting and storage period in fresh vegetable packing plants, and during the late fall and winter season in potato plants. In peak periods, some additional itinerant labor may be required.

Two to four month breaks may occur in spring and summer months unless the plant undertakes a supplementary processing enterprise during that time.

Married women adapt well to the activities of sorting and packing, and do not mind the occasional necessary suspension of activities.

Size of Labor Force:

Small plants which may suit an individual enterprise or a family partnership occasionally reach the point at which a regularly employed plant crew is required. In terms of potatoes, with an output of 5,000 tons, about 10 workers are required. With other stored root crops involving 600 tons and unit packaging, 8 to 10 workers are required.

A large plant, the category in which we usually consider centralization to be effective, may, for instance, have an output of 60 to 80 tons of potatoes a day or a possible seasonal output of 15,000 to 20,000 tons. This output may be expected to require in the neighborhood of 20 regular workers on a single 8-hour shift basis for a minimum 10-month period.

There are not enough "other root crop" plants on which to base an expected crew size, but usual comparative costs between potato and other root crop preparation services show that costs per ton of output are about four times higher for "other vegetables". Most of the additional cost is due to the additional labor required in inspection, sizing and small unit packaging. At this stage, it is only possible to estimate that the crew of 20 workers could be expected to handle only one sixth as much volume as the potato crew in the same working period.

It may be expected that some root crop packaging enterprises in

Alberta will be associated with centralized potato plants and hence, the working crew will handle both enterprises. Where vegetable packaging plants are organized to handle only fresh vegetables, exclusive of potatoes, the initial capacity will probably range from 500 to 1,500 tons output per year and require a working crew of 8 to 12 workers in addition to administration and clerical staff. While this output appears small, the market value of the produce is much higher than a similar volume of potatoes.

Skills:

According to vegetable plant operators, most workers are able to learn on the job. Managers would prefer experienced workers but only key workers must have had previous training.

Mechanization:

Though equipment is used wherever possible in the receiving, preparation, storing and shipping activities, all these functions require human assistance, inspection and control. Safety, convenience and reliability are the mechanical features most appreciated by plant workers.

Hours of Work:

The working day is recognized to be 8 hours. Plant operation is characterized by peaks of activity in response to concentrations of orders for produce. A two-shift system should be anticipated at such times.

Wage Rates:

Rates of pay vary according to the importance of the job and the experience of the worker. Certain plants may, by their location, be classed as agricultural enterprises. Others may be classed as industrial undertakings subject to the Department of Labor regulations. In the latter case, legal minimum hourly rates will be recognized. Rates will begin at $1.15 per hour. In the former case, hourly pay, while not regulated, currently range both above and below the $1.15 figure. Schedules of wage rates, which appear to be most applicable to jobs in vegetable packing plants, appear on pages 28 to 30 in the Appendix.

Working Conditions:

Centralized Plants -

The larger the plant, usually the more attention is given to working conditions. Adequate lighting, air circulation, safety devices, washroom , lunch rooms, etc. tend to promote good employee relations. These conditions should be given consideration in original construction plans.

Employee Advancement -

Further training, particularly for key positions, should be encouraged as a means of retaining the best personnel and increasing the efficiency and scope of the enterprise in this developing industry.

SECTION VII FUEL, POWER AND SUPPLIES

Four utilities essential to the fresh vegetable industry in southern Alberta are: (1) natural gas; (2) electric power; (3) water, and (4) communications. In general, fuel and power provided the basis for industrialization in the past. At present, communications must also be considered. Water has always been essential to industrialization, mainly in an indirect manner, through hydro electric power. The availability of raw materials, labour and utilities strongly influence the location of a plant.

(1) Natural Gas

Several firms in Alberta own their own gas wells, but supplement their requirements from city or municipal gas mains. Other firms purchase their entire requirements from a gas company. For example, the clay products factories in Medicine Hat have long been using local gas. The availability of natural gas in the specialized crop area of Alberta is indicated in Table 25 , Appendix.

It may be argued that the forecasts of Alberta reserves have been conservative. At present, the reserves are regarded as more than adequate for industrial and domestic consumption in the future. Estimates of the reserves vary between thirty and forty years supplies. The accuracy of the estimates will be known only at some time in the future.

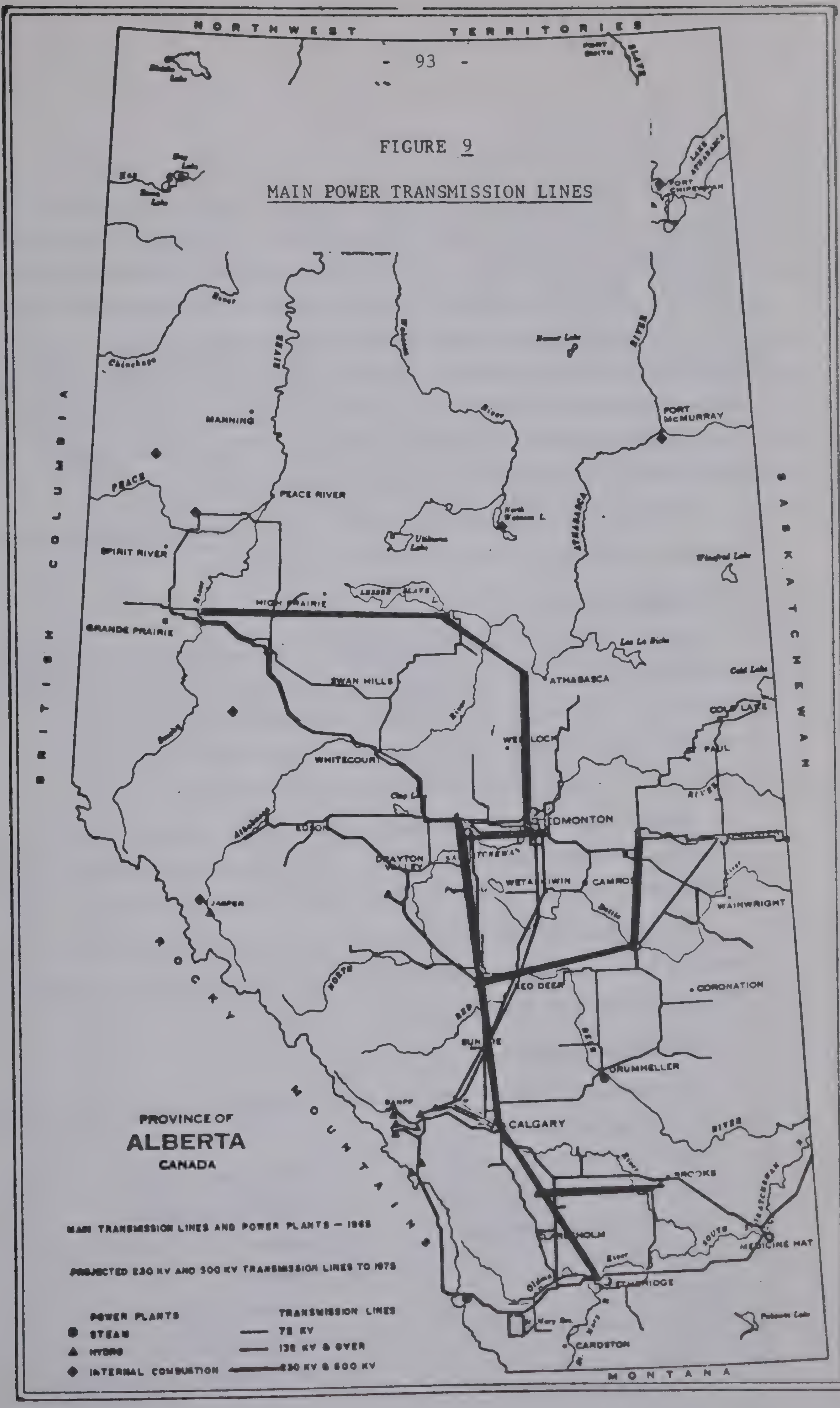
(2) Electric Power

The location of the main transmission lines are shown on page 93 , Figure 9. Approximately 75% of the total power required in the province of Alberta is supplied by three private corporations (Calgary Power, Canadian Utilities Limited and Northland Utilities Limited). The remaining 25% is supplied by municipal corporations (The Cities of Edmonton, Lethbridge and Medicine Hat).

Power for industrial purposes is available in the areas adjacent to the main transmission lines. The vegetable growing areas in southern Alberta are serviced by Calgary Power and the Cities of Lethbridge and Medicine Hat. Electric power rates are set forth in Table 26, Appendix.

FIGURE 9

MAIN POWER TRANSMISSION LINES



(3) Water

For the majority of processes in the vegetable industry, a large quantity of water is an essential commodity. The Province of Alberta has specified the following priority ranking for the consumption of water, domestic, municipal, industrial, irrigation, water power, and other uses.

Certain locations in the eastern part of the province - dependent on water supplies from shallow wells - would prove to be unsatisfactory for major industrial water consumers. But locations for industrial plants using large amounts of water may readily be found along the major streams and rivers, or at certain favourable ground water sites.

The sources of water available to the vegetable growing areas in southern Alberta are found in Table 27 , Appendix.

(4) Communications

As the vegetable producing areas of Alberta are far from the large populated markets of North America, communication between growers, processors and wholesalers is a basic requirement of the industry. Knowledge of market prices, delivery dates and availability of produce is essential to an industry dealing in perishable goods.

Three communication systems are available to plants located in the vegetable growing areas of Alberta: (1) Alberta Government Telephones, (2) Railway teletypes, and (3) Government of Canada Postal Services.

In addition to the utility requirements of the industry, there is a need for plant supplies. Packaging of fruits and vegetables is fast becoming a science in its own right.

(5) Operating Supplies

The manufacturers of supplies and equipment are generally grouped in the following categories:

a. Baskets, boxes and crates
b. Bags (paper and plastic)
c. Coolers (Hydro & Vacuum)
d. Ice machines
e. Conveyors
f. Trucks (hand and lift)
g. Brushes
h. Graders and sizers
i. Bagging equipment
j. Scales
k. Washers
l. Blowers and fans
m. Refrigeration
n. Bin loaders and unloaders

Supplies and Equipment in the categories listed on the previous page are well represented in the two major cities in Alberta. Plastics, cardboard and polyethylene containers for vegetable products are manufactured and distributed in Edmonton and Calgary. Equipment such as chain conveyors, vegetable washers, and blowers and fans can be manufactured locally. Other equipment such as ice machines, mobile forklifts and refrigeration systems are distributed by Alberta dealers. Graders and sizers, and plant hydro coolers must be obtained mainly from foreign suppliers. Increased development in the domestic fresh vegetable industry may encourage manufacturers of the heavier and more intricate equipment to establish manufacturing plants in Alberta. The United States is the present source of such equipment.

In summary, fuels, power, water, communications and supplies are available to the vegetable producing areas of Alberta in abundant supply. There is a possibility of a water shortage in some areas while a shortage of power or natural gas is very unlikely.

SECTION VIII RELATED INDUSTRIES

(1) Associated Industries

A grower cannot expect the entire yield of a fresh vegetable crop to be of a marketable quality. Vegetables may be too large, too small, or damaged beyond the accepted tolerance limit established for markets. There are several industries which can use these grade-outs economically: (a) potato starch, (b) animal foods, (c) dehydrating plants, (d) frozen foods, (e) soup base industries, and (f) the canning industry.

(a) Potato Starch

It would be difficult to operate a plant economically unless it has raw materials available over a period of several months each year. Rarely would the supply of cull potatoes be sufficient and distributed so that plants can operate at capacity throughout the season. Potato starch is utilized by the paper, textile, food and potash industries. The Saskatchewan potash industry can be a significant user of cull potatoes.

(b) Animal Foods

Although animals will eat most vegetables, the most common animal food may be classed as "potatoes for livestock". Potatoes may be fed to cattle and hogs raw, cooked, dried or as potato silage. Carrots are a premimum by-product food.

(c) Dehydration Plants

The dehydration of vegetables has been a significant step in food preservation. In countries where refrigeration is scarce, dehydrated food may supply millions of people with the vitamins and nutrients they are lacking. Vegetables that are too small or too large may be used in the product but damaged vegetables must be excluded. Certain of these foods may be classed as powdered or grandulated potatoes, concentrates for vegetable juices, purees, powders and pastes.

(d) Frozen Foods

The producers of frozen food products require high quality raw vegetables. Culls or damaged vegetables are not desirable in this industry but oversize and undersize vegetables are satisfactory. The freezing process has been advanced by the development of the liquid nitrogen and the freeze-dry methods.

Alberta firms should participate in the expanding use of frozen vegetables such as by frozen french fries, peas, beans and diced vegetables.

(e) Soup Base Industry

Many vegetables are required in the preparation of soup bases. As some of the vegetables used are dehydrated, this type of industry is closely associated with the dehydration processors. The soup industry is found predominantly in eastern Canada. Expansion of a soup base industry in the near future would be through contractual arrangements with soup producers in eastern Canada.

(f) Canning Industry

People associated with the canning industry stated that they require top quality vegetables for canning. They do not use damaged produce. Oversize and undersize produce may be acceptable if the desired level of quality is maintained. For example, carrots must be long and straight if they are to be marketed in a fresh pack. Twisted carrots, while undesirable for fresh packaging, have a quality level equal to straight carrots. The same is true of other vegetables as well.

Expansion in the canning industry is deterred by the expanding frozen and dehydrated food industries. The consumption of canned foods is increasing in real terms, but as a per cent of total food consumption it is remaining constant. However, canning companies will continue to play an important role in the fresh vegetable industry in Alberta.

As related industries expand, they will demand labour, fuel, water and other services. In addition, they will require plant sites, construction materials and they will pay taxes. They will require packages, polyethylene bags, cardboard boxes, tin cans and labels for their products.

This leads to the full vertical integration of the fresh vegetable industry. One would expect the profitability of the industry to rise as each additional part of the vegetable crop is utilized. This will depend on the management capability of the firms in the industry.

The type of integration can vary according to the circumstances relevant to a particular industry. Some firms may sell their grade outs to a vegetable processor. Other firms may process their own culls. It does not matter which form of integration is adopted as long as the vegetable crop is fully utilized.

(2) Local Possibilities

The production of vegetable crops in Alberta would be expected to stimulate the growth of local industries.

Containers - wooden boxes, cardboard containers, polyethylene bags, plastic bags are required in harvesting, storing and shipping operations.

Washing and sanitary supplies - these items including soaps, disinfectants and certain chemicals are required in preparation of vegetables for market.

Refrigerated transport - trucking facilities capable of hauling pershable produce would grow with expansion in the fresh vegetable industry.

Maintenance concerns such as electrical plumbing, carpentry and refrigeration could be expected to expand their services in both the construction and operational stages of vegetable plant facilities.

Supplementary industries - strong economic reasons prompt the total usage of the crop. This suggests that wherever possible some measures be taken to process excess or culled fresh vegetable produce. Independent or subsidiary operation of such facilities in the vicinity of fresh vegetable plants is recommended.

SECTION IX TRANSPORTATION

Transportation has become progressively more important in the distribution of perishable foods. Previously, transportation meant merely moving commodities from one point to another. The addition of refrigeration to this service has resulted in a tremendous expansion in the distribution of fresh fruits and vegetables throughout the continent.

Year-round availability of fruits and vegetables has come to be regarded as commonplace in North America. High speed movement, favorable traffic rates, scientific means for product preservation enroute and elaborate handling facilities are the modern essentials necessary for making this distribution possible.

The distances from Alberta to existing and potential markets are important because of the assessments for freight and the accompanying charges for mechanical refrigeration. Figure 10 on page 100 shows the approximate distances from Alberta to the important market centres in North America.

Several important factors in the movement of fresh vegetables merit explanation. They are: (a) the modes of transportation, (b) responsibility for product deterioration, (c) temperature and humidity control, (d) the freight rate structure, and (e) restrictions on the transportation systems.

(1) Modes of Transportation

The Railroad:

Alberta is well served by railroad systems.[1] In addition to transportation, railroads provide freight service:

- at shipping and destination points.
- while goods are in transit.
- "piggyback" services for trailer trucks.
- spotting cars, inspecting contents and handling business papers.

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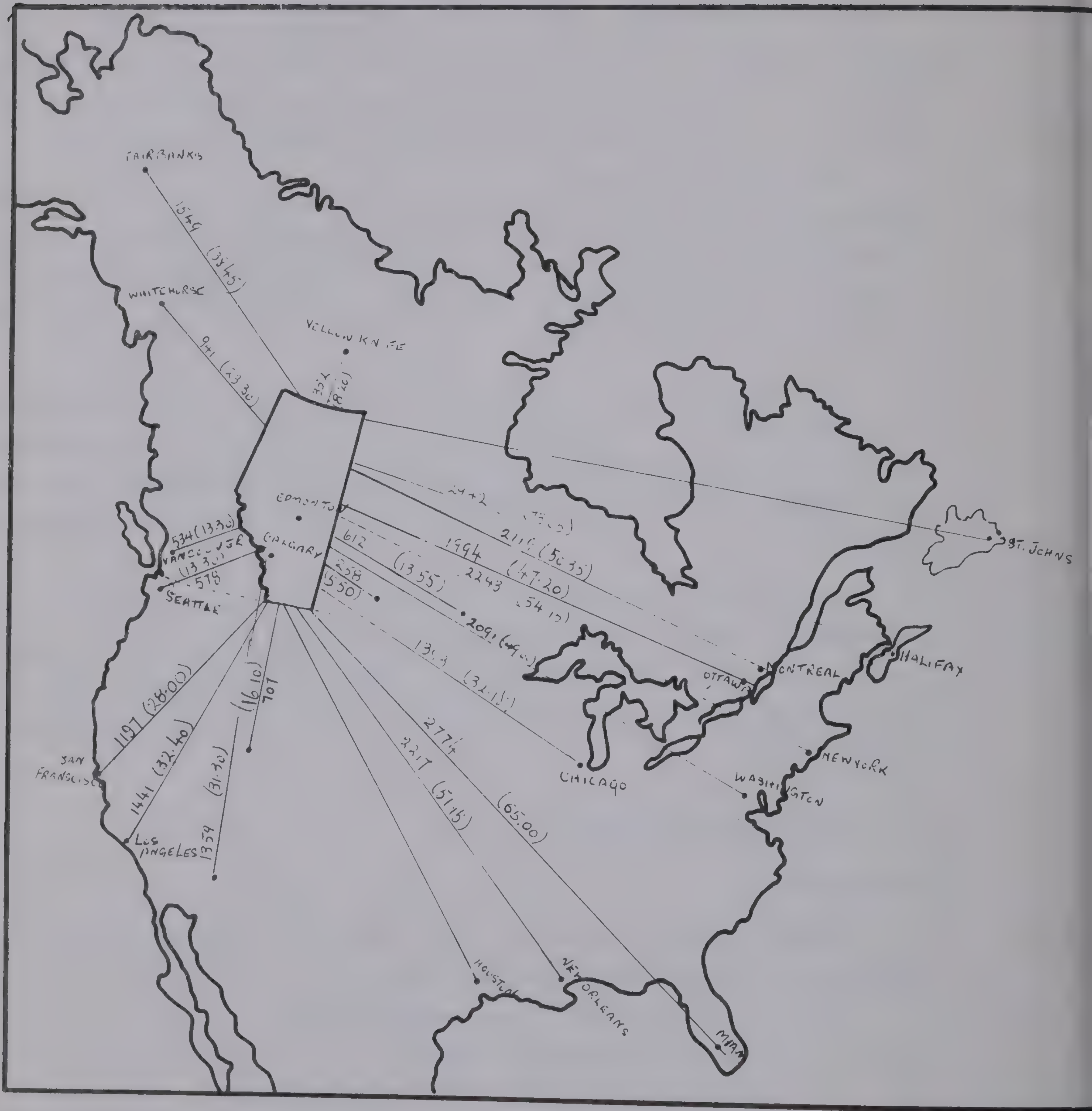
[1] Figure 11 , page 101.

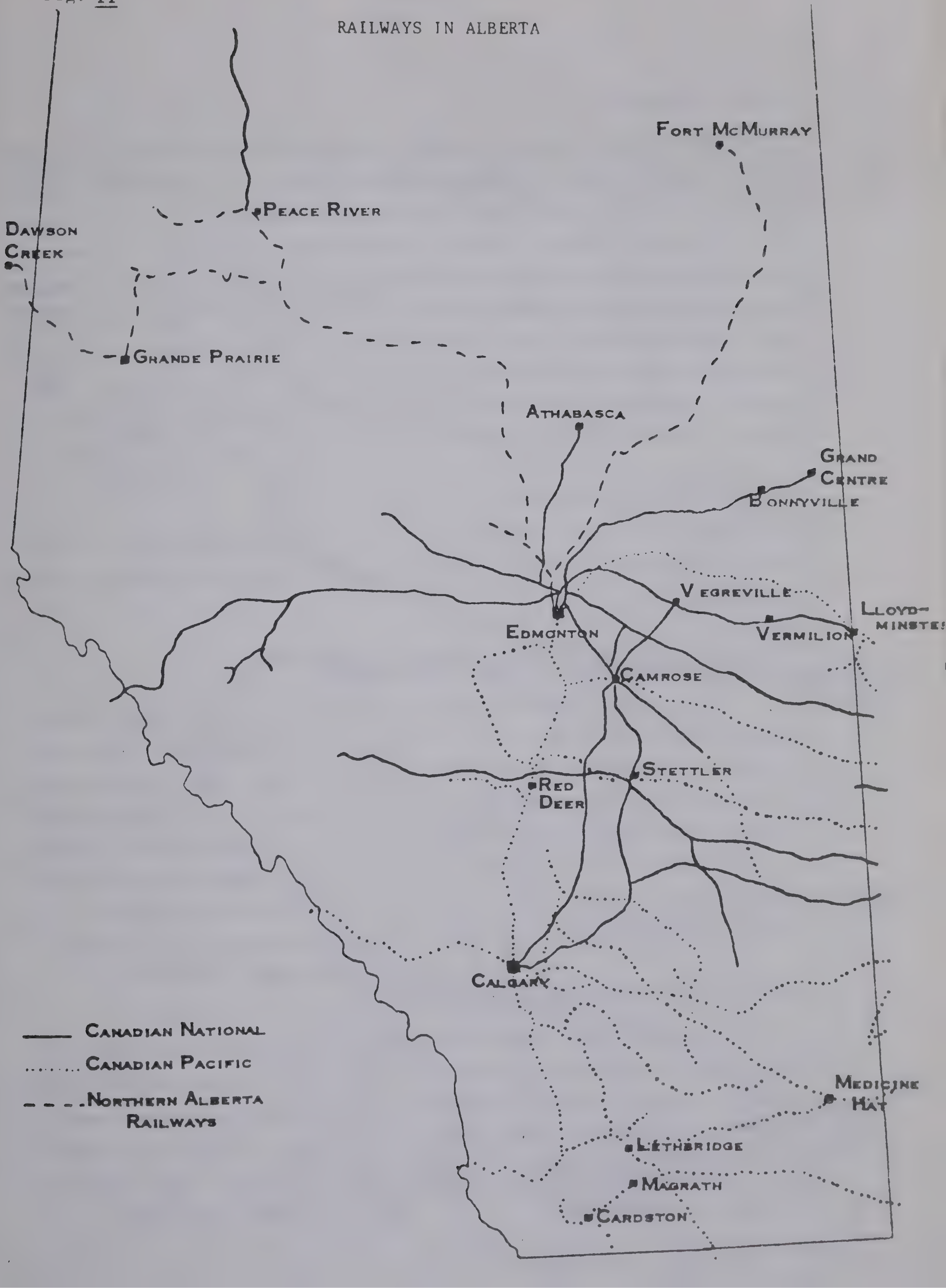
Figure 10: DRIVING TIMES AND DISTANCES FROM ALBERTA TO NORTH AMERICAN CENTRES



Source: Department of Highways, Alberta.

Fig. 11

RAILWAYS IN ALBERTA



Motor Transport[1/]:

About one third of the movement of perishable products is accomplished by motor transport. Insulated trailer trucks with mechanical heating and refrigeration units have become reliable means of transport in the fresh vegetable industry. Their service has the advantage of direct shipment between origin and destination without the necessity of trans-shipment. Truck services are of three classes: private carrier, contract carrier, and common carrier. The first two services are arranged between the consignee and the transporter. In the case of the third, the common carrier, rates are required by law to be open to public scrutiny and to apply to all users on a regular basis.

Air Transport:

Air services are designed primarily for the transportation of the small shipments of high value goods because of time and emergency considerations.

(2) Responsibility For Product Deterioration

If government inspection at the shipping point establishes a satisfactory condition of the produce involved, the responsibility for deteioration is normally removed from the grower-shipper. When deterioration occurs en route due to improper temperature control, the transportation company is usually liable. In actual practice, the settlement of damage for deterioration often has to be borne by the shipper because of the difficulty in determining the real cause of product deterioration, and the necessity of continuing business relationships with the consignee.

(3) Temperature and Humidity Control

The most preferred type of refrigeration service is mechanical refrigeration in which the railroad cars or trailer transports are equipped with thermostatically controlled cooling systems. Another common system of cooling perishable produce in transit is the "ice bunker" system. An auxiliary method of cooling is the "top or body icing" in

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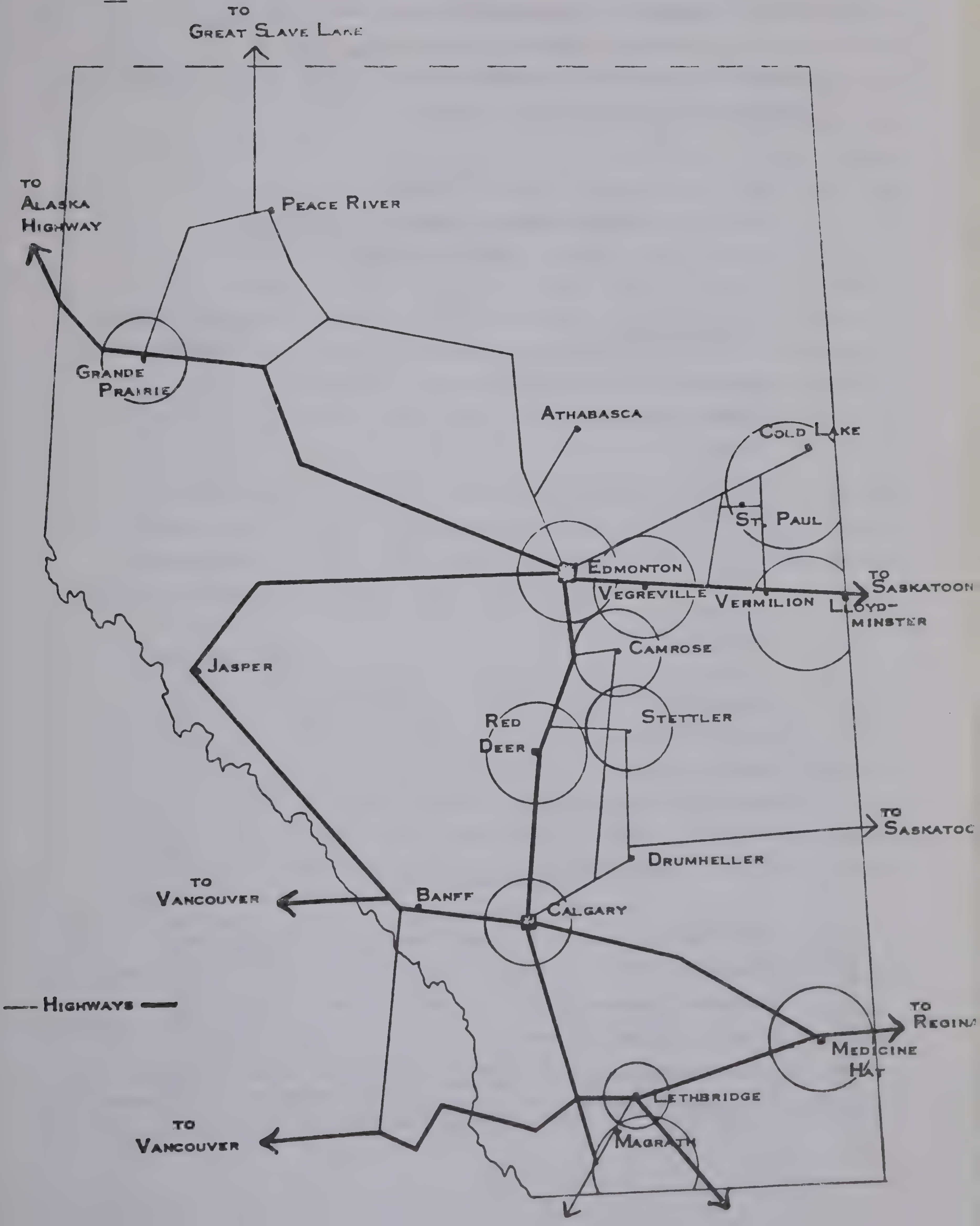
[1/] Figure 12 on page 103.

HIGHWAYS IN ALBERTA

Fig. 12



which crushed ice is blown inside the car to make direct contact and to cover the produce. Specific temperatures have to be maintained for different vegetables in transit. The importance of this practice is emphasized in Table 31 which follows.

TABLE 31

DESIRED TRANSIT TEMPERATURES OF CERTAIN FRESH VEGETABLES[1]

Commodity	Desired Transit Temperature °F
Asparagus	34 - 38
Beans (snap)	45 - 50
Beets	32 - 40
Brocolli	32 - 36
Cabbage	32 - 40
Cauliflower	32 - 40
Carrots	32 - 38
Celery	32 - 36
Corn (sweet)	32 - 36
Cucumbers	45 - 50
Lettuce	32 - 36
Onions (dry)	32 - 40
Peas (green)	32 - 36
Potatoes - Early Crop	55 - 65
- Late Crop	40 - 50
- For Chipping, Early Crop	60 - 70
- For Chipping, Late Crop	50 - 65
Radishes	32 - 40
Spinach	32 - 40
Tomatoes - Mature Green	55 - 65
- Ripe	45 - 50

---

[1] United States Dept. of Agriculture, "Agricultural Handbook No. 195".

Ventilation serves to modify humidity and temperature in refrigerator cars. Vents in the car or truck are manually or automatically controlled. Ventilation also serves to remove stale air on long or delayed hauls.

These are protective services which are designed to maintain the best possible conditions of market quality in perishable produce. These protective services may be described as: refrigeration, ventilation and heat. The distribution of Alberta vegetables during the winter requires heat to prevent freezing. Therefore, without these services, no long distance movement of fresh vegetables could occur in sub-zero weather. Freight cars are heated by underslung alcohol or propane units. Mechanical refrigerator cars are equipped with electric heaters. A few mechanical systems are reversible and are able to supply either heat or cooling services. On occasion, trucks use a heating system connected with the truck's motor.

Temperature and humidity controls work best in association with pre-cooling. Pre-cooling is the refrigeration of produce prior to shipment. If this sequence is followed, very little deterioration can occur between the shipping point and the final destination.

(4) Freight Rates

Freight charges can make the difference between an economic industry and none at all. Railroad rates are set to conform to the requirements of industry and the capacity of industry to support railroad services. (What the traffic will bear and what the competitor will charge are also considerations). In addition, negotiations between industry and railroad can often disclose a situation where agreed rates (lower than normal freight rates) may apply.

Some instances of current rates lead one to believe that there are inequalities existing in the rate structure. This inequality arises from the fact that the freight rates of products shipped from Alberta to Toronto are much higher than rates of products shipped from the Maritimes to Toronto. More specificially, New Brunswick potatoes are shipped to Toronto at a rate of 61 cents per hundred weight while Alberta potatoes are shipped to Toronto (approximately 500 miles farther) at a rate of \$1.80 per hundred weight.[1/]

This inequality must be corrected, otherwise Alberta potatoes will have difficulty in entering the Toronto market at a competitive price.

Tables 18 to 20, Appendix, show railway produce transport rates for the movement of produce from selected Alberta centers to distant markets.

Applications of these rates are shown in respect of certain vegetables on the following pages.

(5) Restrictions

Restrictions on motor transport vehicles limit the movement of vegetables between provinces and states. Each province and state has special laws governing load limits and licensing. For example, a truck sixty feet long is permitted on highways in Alberta, Saskatchewan and Manitoba. However, if the destination of the shipment were St. Paul, Minnesota, a definite problem would arise from the fact that the maximum vehicle length in Minnesota is fifty feet.

In addition, there is the problem of load limits on rural roads being different from the load limits on the main highways. As a result, to load the maximum weight permitted on the main highways would cause the vehicle to be overloaded on the rural roads. If, on the other hand, the truck is loaded to the limit placed on a rural road, it would be underloaded for a major part of the journey. One solution is to locate the packing plant on a highway which permits the highest load limit and direct connection to major markets.

The railroad systems are not faced with the load limit problem. The load limit is a function of the size of the carrier. In other words, it is a physical restriction, not imposed by law, but imposed by the capacity of the box car.

[1/] Alberta Freight Bureau.

Conclusions:

Transportation, by physically linking grower and consumer, reaches into all phases of the marketing process. Consequently, any basic change in transportation will have far-reaching effects. The Government needs to know about such changes in order to carry out its regulatory functions. Shippers and buyers need such information, as a change in mode of transportation also requires adaptation in their operations. The carriers themselves must be compelled to study trends in the division of traffic between rail and truck in order to compete effectively.

Based on the foregoing discussion, the following recommendations are offered here:

(1) Canadian transportation companies should have enough refrigerated trucks and railway cars to provide adequate transportation services.

(2) Inequities in the freight rate structure should be reviewed.

(3) Highways throughout the province must be standardized so that uniform load limits apply.

(4) There should be wide open competition between common carriers.

SECTION X TARIFFS

(1) Import Duties and the Fresh Vegetable Trade

As is the case with other commodities entering Alberta from foreign countries, vegetable products, whether fresh or in any other form such as canned, packaged, crated, frozen or combined with foods of any other kind, are classified for purposes of import control by the Canadian Government.

Schedules of import duties on important fresh vegetables for both Canada and the U.S.A. are shown on pages 113 , 114 and 115 .

Import duties have long been employed as preferential devices used to direct trade to particular countries or in specific direction. General aims are to:

(a) regulate the nature of the goods traded,
(b) protect and encourage the growth of domestic industries,
(c) secure revenue,
(d) maintain a suitable balance of trade.

Vegetable products, more than any other imported commodity, are subject to seasonal applications of duties. The object of such variable tariff impositions is to restrict the inflow of foreign vegetables during the domestic harvesting season and subsequent period of sale for vegetables in storage. At other times of the year, relaxation or complete removal of tariff charges is made to encourage foreign exporters to supply such commodities to satisfy our domestic consumer need without adversely affecting the livelihood of our domestic producers.

Import levies on vegetables are known as:

(a) Specific duties - These are assessed on the weight of the import commodity.
(b) Ad Valorem duties - The duty is assessed as a precentage of the declared value of the commodity.
(c) Dumping duties - This duty is a penalty duty applied when the declared value for duty is found to be less than the cost of production in the originating area.

In addition, non-tariff devices are commonly used to limit the amount of imports. Quotas, subsidies to domestic producers and restricted periods of delivery, often modify tariff agreements.

Canadian Import Protection:

The protection afforded Alberta vegetable growers is difficult to measure. American produce is sold in our grocery stores in every month of the year. The foreign shipper makes a decision on the profit margin he is willing to accept. To this must be added costs of freight, refrigeration in transit, import duties and exchange. The price per unit at the destination must allow a margin of profit for both wholesaler and retailer. The degree to which the shipper will shade his profit or commission on foreign shipments is often the determining factor in the movement of the produce.

One device is the consignment of mixed carlots of fruit and vegetables. This assists the entry of vegetables by allowing the fruit to absorb a portion of the more stringent duties on fresh vegetables.

Until recently, the effective roothouse winter storage period for Alberta commercial vegetables, other than potatoes, ended about January first. Modern storage adds three to four months to this period. Import restrictions on foreign produce could be extended to cover this additional period of time.

U.S.A. Import Protection:

Canadian export potatoes are subject to a U.S.A. quota limitation. This is an effective non-price restraint on imports additional to the usual import duty of 37½¢ per cwt. The duty is doubled to 75¢ per cwt. after the quota is filled. Alberta exports of potatoes to the U.S.A. are thus subject to inequitable tariff regulations. United States duties on other fresh vegetable imports are similar but not identical with Canadian duties.[1/]

Other fresh vegetables from Alberta have not made a significant entry into the U.S.A. market. This is not because of the U.S.A. import duties.

[1/] Schedules 8 and, 9 , pages 113 and 114.

Aside from potatoes, fresh vegetables are not produced in large scale in Alberta. With the growth of some large units, market tests in the U.S.A. may be expected to occur. Until the new processes in winter storage become stabilized and proven in commercial usage, fresh vegetable exports to the U.S.A., from Alberta, will probably remain in the development or experimental stage.

(2) The Kennedy Round

On June 29, 1967, results of international talks on tariff negotiations were released by the Canadian Government. A long period of negotiations, in which nearly all nations of the world participated, concluded with a general lowering of national tariff structures.

Agricultural commodities had been the most difficult on which to effect tariff agreement between negotiating states. All participating countries were concerned with maintaining viable agricultural economies at home and, therefore, resisted reduction in import duties.

The U.S.A. and Canada:

American and Canadian reductions in import tariffs were announced as affecting about $2,000,000,000 worth of trade in each of the two countries. The adjustments of major importance appear to have been applied to the products of manufacturing industries. Agricultural tariff adjustments were of considerably lesser scope and significance affecting only $95,000,000 of trade. Equal reductions were made by the U.S.A. and Canada respecting forage seeds, vegetable seeds, turnips, apples and parsnips. No concessions were made on imports of potatoes into the U.S.A. "Free Periods" of limited duration and equal reductions of former rates on Canadian and American imports were agreed upon. These referred to fresh carrots, Brussels sprouts, corn-on-the-cob, parsley, radishes, brocolli and a few others.

In respect to Canada's fresh vegetable export trade with the U.S.A. no large advantages were negotiated for Canadian growers. The relatively vast American sales of vegetables and fruit into Canada greatly over-balance reciprocal Canadian sales to the U.S.A.[1] In 1965, the U.S.A. exported approximately $73,000,000 worth of vegetable and potato foods into Canada. Canada exported vegetable produce valued at $14,000,000 to the U.S.A. Total fruit exports from the U.S.A. to Canada in 1965 were valued at $126,600,000. Canadian exports to the U.S.A. were valued at $9,600,000. The relative values of this total respective export trade are very far apart. These obvious imbalances suggest that Canadian producers may enlarge their markets by securing tariff modifications.

Other Trading Nations:

Among the trading groups represented by the European Common Market, the Commonwealth trading countries, the Outer Seven, and other nations signatory to the G.A.T.T. agreements, little significant benefit appears to have risen for exports of either Canadian fresh fruits and vegetables, or processed produce.

Exports and Imports of Produce:

In general, the imports of vegetable foods into Canada have far exceeded the exports.[2] In respect to the fresh vegetable trade, exclusive of processed vegetables, a similar relationship has existed. The U.S.A. sells Canada far more fresh produce that any other country because of its proximity to Canada and its ability to grow a wide range of vegetables and fruits. However, other countries supply Canada with additional fresh vegetables.[3] It may be seen with reference to Tables 22 and 23 that Canada's reciprocal export trade in vegetable foods ranges in value over the years from 1/4 to 1/3 the value of the imports. This situation need not continue indefinitely if production of adaptable vegetables in both Eastern and Western Canada develops. In time, the benefit of tariff changes, further than those negotiated in the Kennedy Round, will need to be assessed.

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[1] Figure 13 on page 112 .

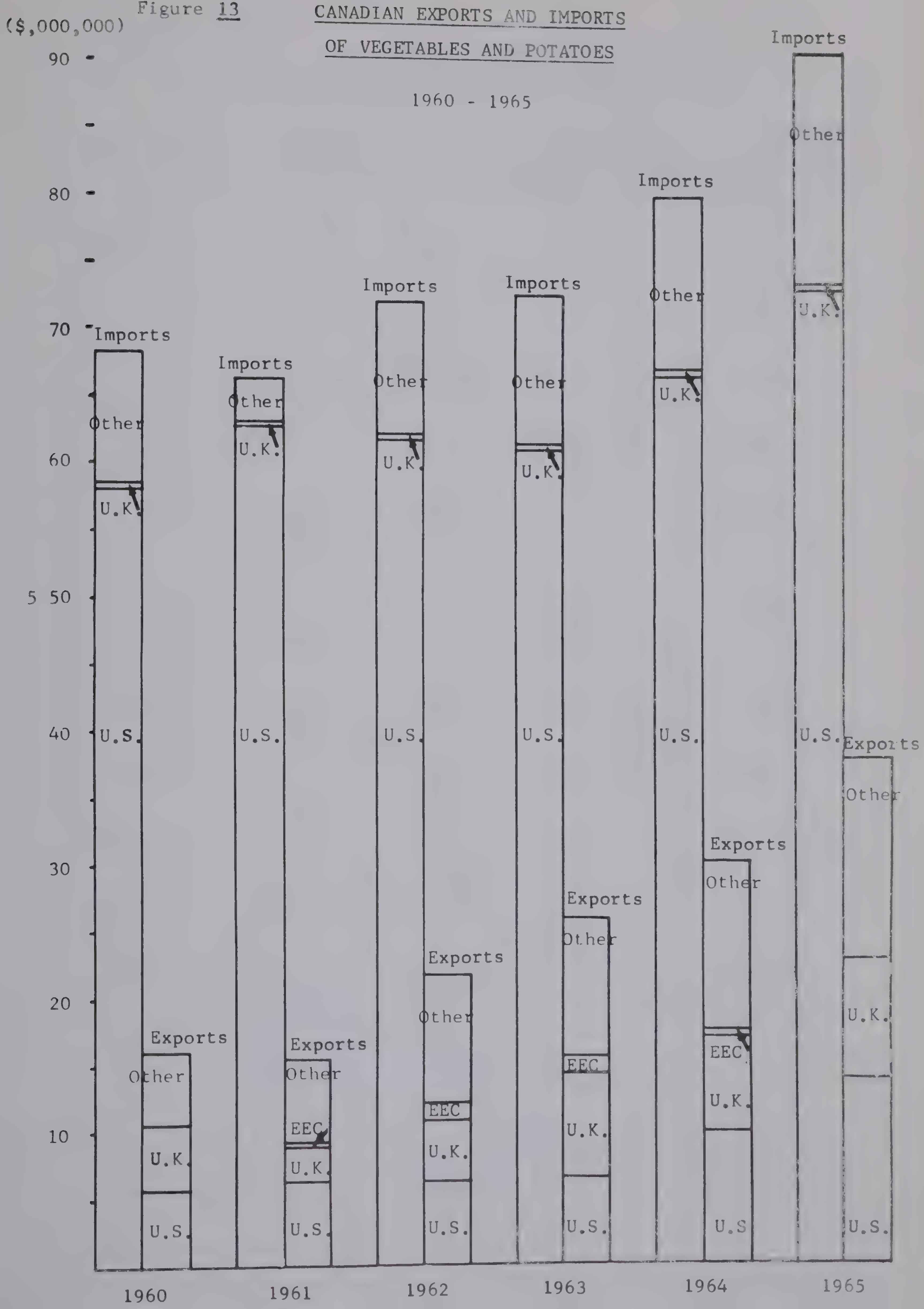
[2] Figure 16, Appendix.

[3] Tables 22 and 23 , Appendix.

Figure 13

CANADIAN EXPORTS AND IMPORTS OF VEGETABLES AND POTATOES

1960 - 1965



Schedule 8

CANADIAN IMPORT DUTIES ON 13 COMMON VEGETABLES

Vegetable	Dutiable Periods	Most Favoured Nation Duties		General Duties	
		Spec. $/Cwt	Ad Val. %	Spec. $/Cwt	Ad Val. %
Asparagus	Sp. Duty 14 wks.	3.50		3.50	
	Ad Val. Duty 38 wks.		10		10
Red Beets	Sp. Duty 26 wks.[1]	1.00		1.00	
	Ad Val. Duty 26 wks.		10		10
Cabbage	Free rate Mar. & Apr.				
	Sp. Duty 30 wks.[1]	0.90		0.90	
	Ad Val. Duty 12 wks.		10		10
Carrots	Sp. Duty 40 wks.[1]	1.00		1.00	
	Free rate 12 wks.				
Cauliflower	Free rate Jan.-Apr. incl.				
	Sp. Duty 20 wks.[1]	0.25		0.25	
	Ad Val. Duty 14 wks.		10		10
Celery	Sp. Duty 24 wks.	2.00		2.00	
	Free rate 28 wks.				
Fresh Corn	Sp. Duty 8 wks.	1.50		1.50	
	Ad Val. Duty 44 wks.		10		10
Cucumbers - Fresh	Sp. Duty 22 wks.[1]	2.25		2.25	
	Ad Val. Duty 30 wks.		10		10
For Pickles	Ad Val. Duty		10		20
Lettuce	Sp. Duty 26 wks.[1]	0.85		0.85	
	Free rate 26 wks.				
Onions	Sp. Duty 44 wks.[1]	1.50		1.50	
	Ad Val. Duty 8 wks.		10		10
Parsnips	Sp. Duty 33 wks.[1]	1.00		1.00	
	Ad Val. Duty 19 wks.		10		10
Potatoes - Fresh	Sp. Duty 52 wks.	0.375		0.75	
Dehyd.	Free rate 52 wks.				
	Sp. Duty			2.25	
Tomatoes	Free rate Jan-Mar. incl.				
	Sp. Duty 32 wks.	1.50		1.50	
	Ad.Val. Duty 7 wks.		10		10

---

[1] Option to import in 1 or 2 periods.

Schedule 9

U.S. TARIFFS ON VEGETABLE IMPORTS[1/]

Headnotes:

1. In the assessment of duty on any kinds of vegetables, any foreign matter or impurities mixed therewith shall not be segregated nor shall any allowance thereof be made.
2. For the purposes of item 137.5 in this part, if for any calendar year the production of white or Irish potatoes, including seed potatoes, in the United States, according to the estimate of the Department of Agriculture, made as of September 1, is less than 21,000,000,000 pounds shall be added to the 45,000,000 pounds provided for in the said item 137.25 for the year beginning the following September 15. Potatoes, the products of Cuba, covered by item 137.25 or 137.26 shall not be charged against the quota quantity provided for in item 137.25.

Section 1: Vegetables - fresh, chilled, or frozen (but not reduced in size nor otherwise prepared or preserved)

Class Number	Description	Rates 1 Spec. $/Cwt.	Rates 1 Ad Val. %	Rates 2 Spec. $/Cwt.	Rates 2 Ad Val. %
135.20	Beets (exclude sugar beets)		5		17
135.30	Cabbage	0.75		2.00	
135.40	Carrots		12.5		50
135.50	Cauliflower (during June 5 - Oct. 15 inclusive)		11		50
135.51	Cauliflower, Other		25		50
135.60	Celery (during Apr. 15 - July 31 inclusive)	0.50		2.00	
135.61	Celery, Other	1.00		2.00	
135.75	Corn (On-the-Cob)		25		50
135.90	Cucumbers (Dec. 1 - February incl.)	2.20		3.00	
135.92	Cucumbers (Mar. 1 - June 30 incl. or Sept. 1 - Nov. 30 incl.)	3.00		3.00	
135.94	Cucumbers (July 1 to Aug. 31 incl.)	1.50		3.00	

Continued...

[1/] Canada Department of Trade and Commerce.

Class Number	Description	Rates 1 Spec. $/Cwt.	Rates 1 Ad Val. %	Rates 2 Spec. $/Cwt.	Rates 2 Ad Val. %
136.60	Lettuce (June 1 to Oct. 31 incl.)	0.85		2.00	
136.61	Lettuce, Other	2.00		2.00	
136.91	Onions	1.75		2.50	
137.20	Certified Seed Potatoes (White or Irish Seed, certified & tagged by a responsible officer. For not over 114,000,000 lbs. per year during 12 month period beginning Sept. 15)	0.375		0.75	
137.25	Table Potatoes (Max. 45,000,000 lbs.)	0.375		0.75	
137.28	Potatoes (Other than certified seed)	0.75		0.75	
137.40	Radishes		12.5		50
137.60	Tomatoes (Mar. 1 - July 14 incl. or Sept. 1 - Nov. 14 incl.)	2.10		3.00	
137.62	Tomatoes (July 15 - Aug. 31 incl.)	1.50		3.00	
137.63	Tomatoes (Nov. 15 to last day of Feb.)	1.50		3.00	
137.66	Rutabagas	0.05		0.25	
138.00	Vegetables (fresh, chilled or frozen & cut, sliced or otherwise reduced in size - but not otherwise prepared or preserved)		17.5		35

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APPENDIX

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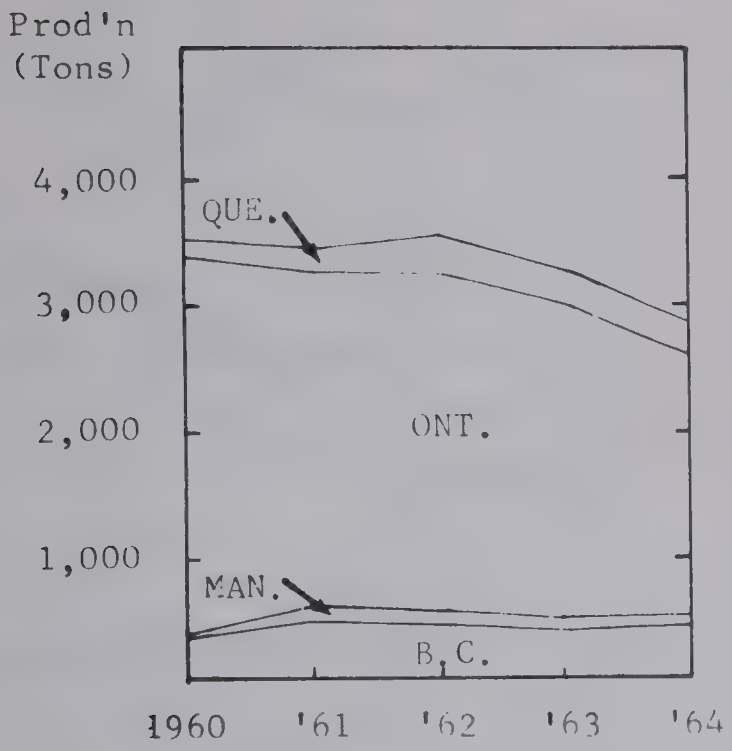
REFERENCES . . . .

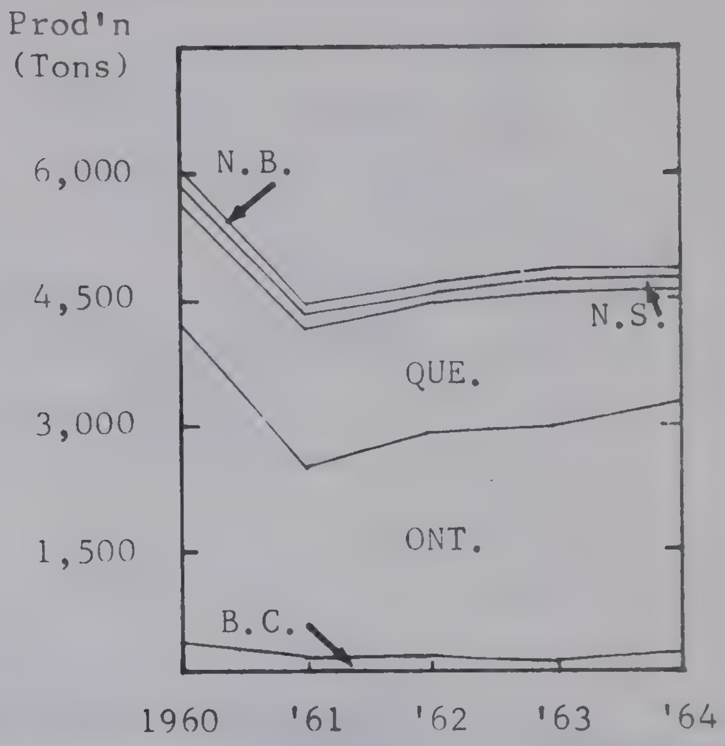
CANADIAN COMMERCIAL VEGETABLE PRODUCTION - BY PROVINCE[1]

1960 - 1964

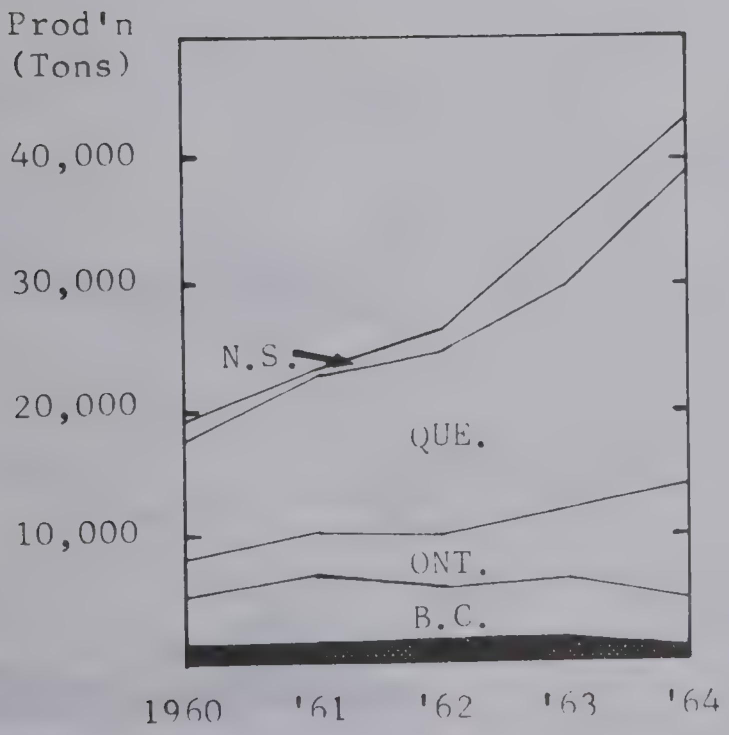
ASPARAGUS
(Alta., N.S., N.B.)*



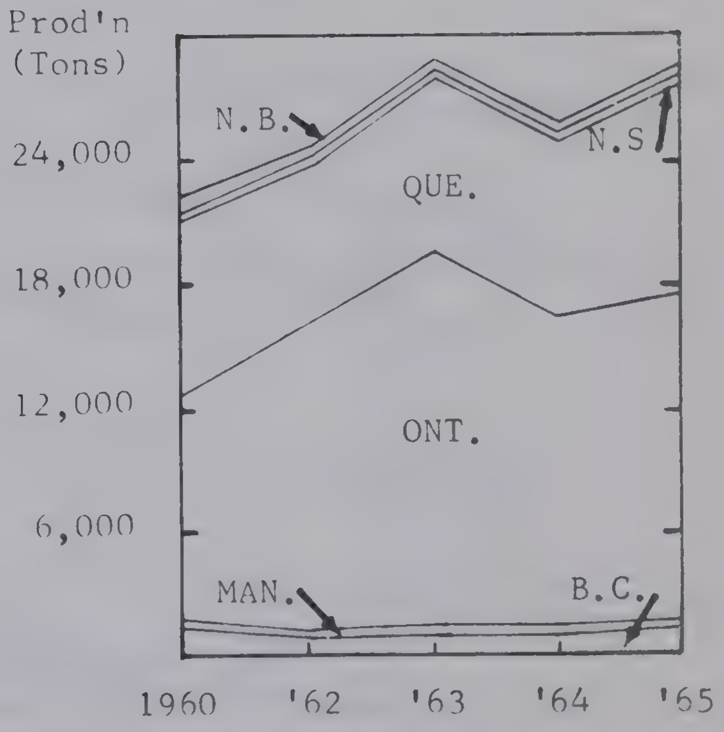
BEANS (FRESH)
(Alta., Man.)*



BEANS (PROC.)



BEETS[1]
(Alta.)*



[1] Man. incl. with Alta.,
N.B. incl. with N.S.

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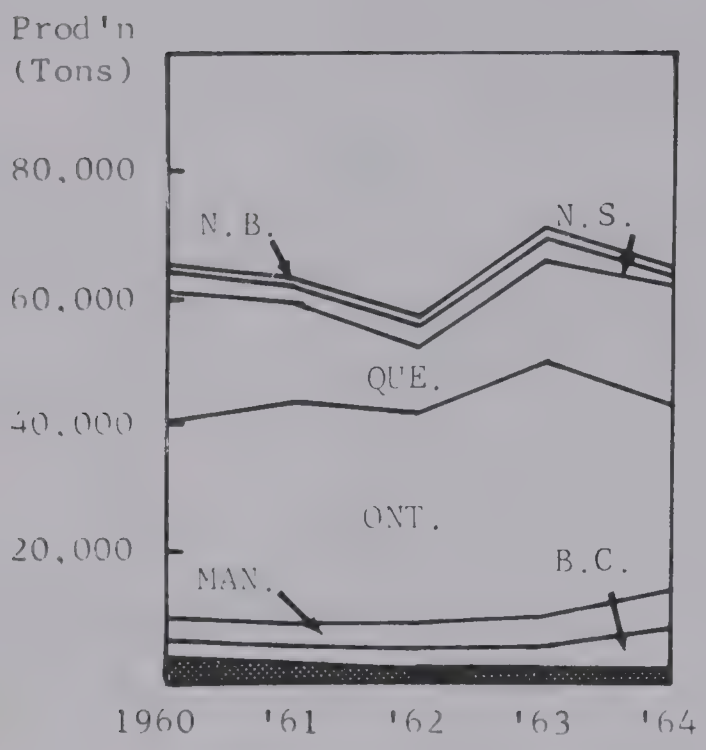
[1] Cat. 22-003, C.D.A.

■ Alberta production.

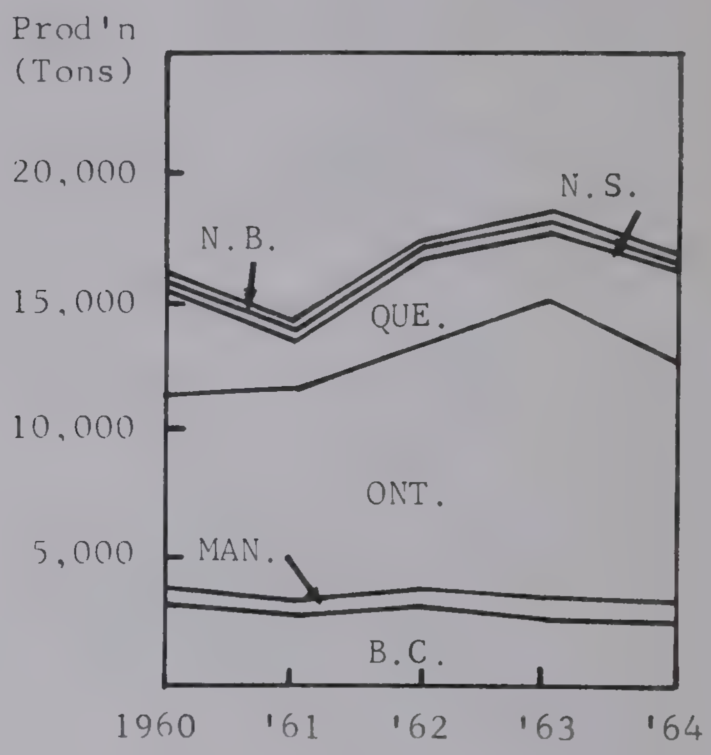
* Negligible production.

CANADIAN COMMERCIAL VEGETABLE PRODUCTION (Con't)

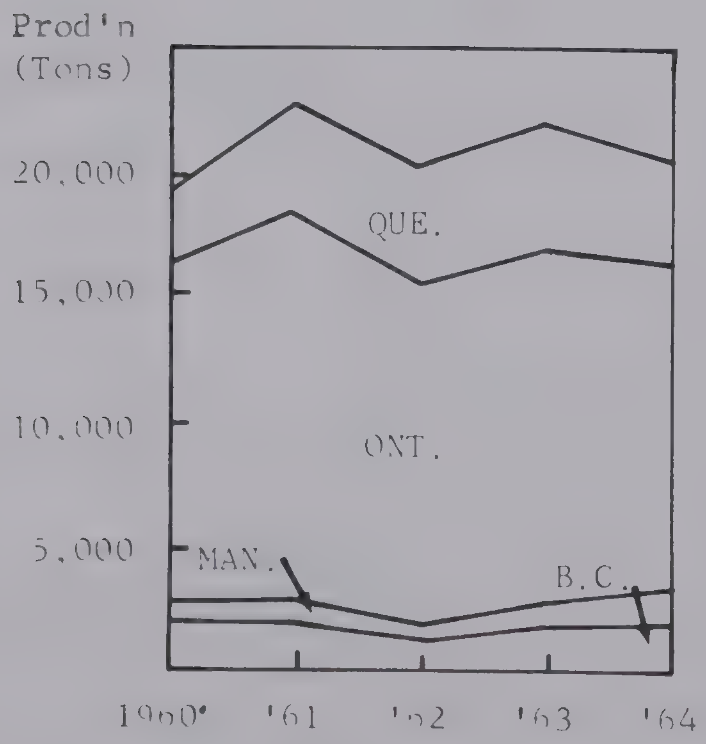
CABBAGE



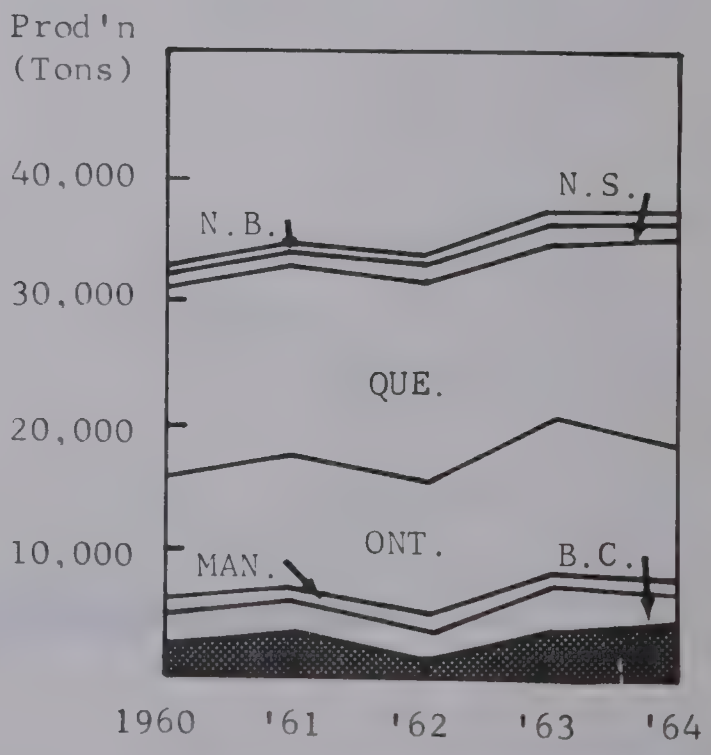
CAULIFLOWER
(Alta.)*



CELERY
(Alta., N.B., N.S.)*



CORN (FRESH)[2]

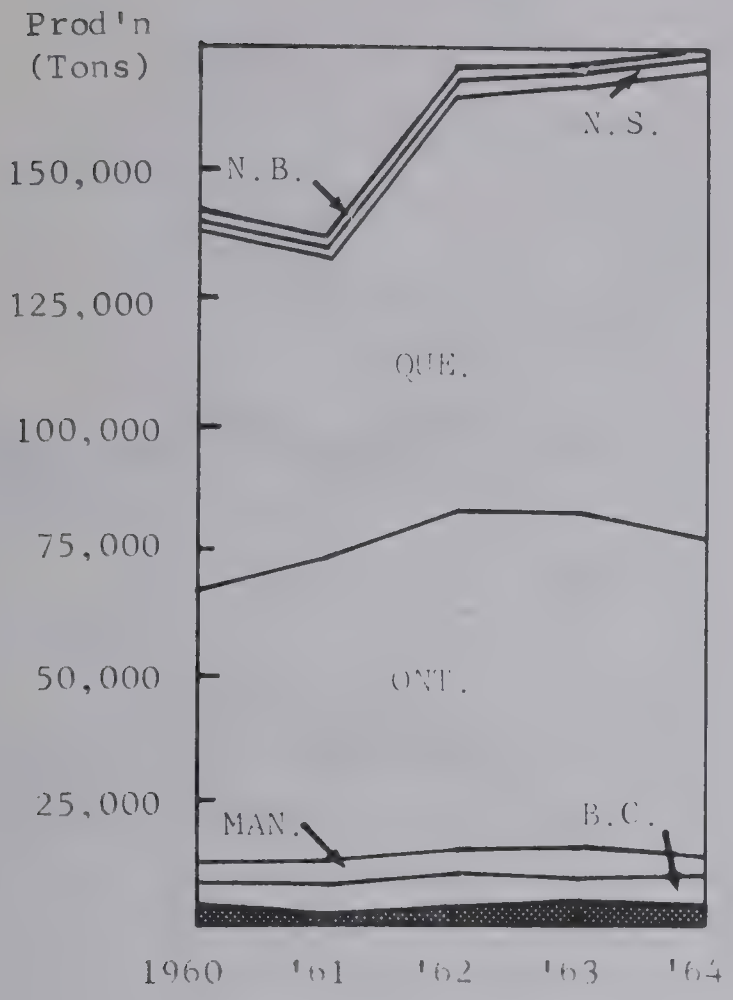


[2] Man. incl. with Alta.

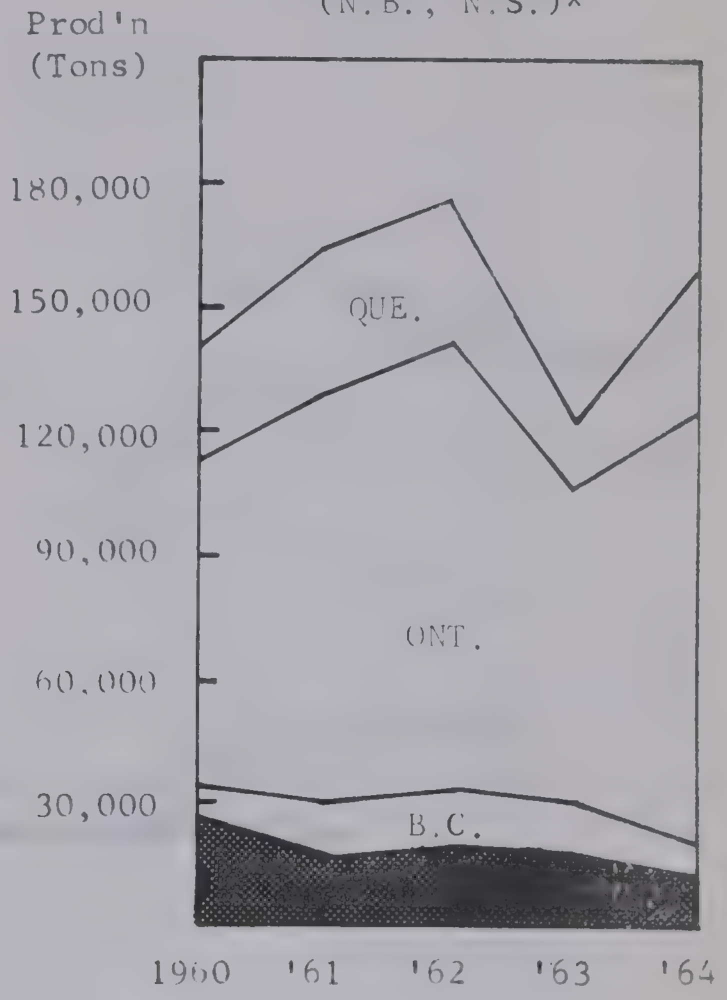
▨ Alberta production. * Negligible production.

CANADIAN COMMERCIAL VEGETABLE PRODUCTION (Con't)

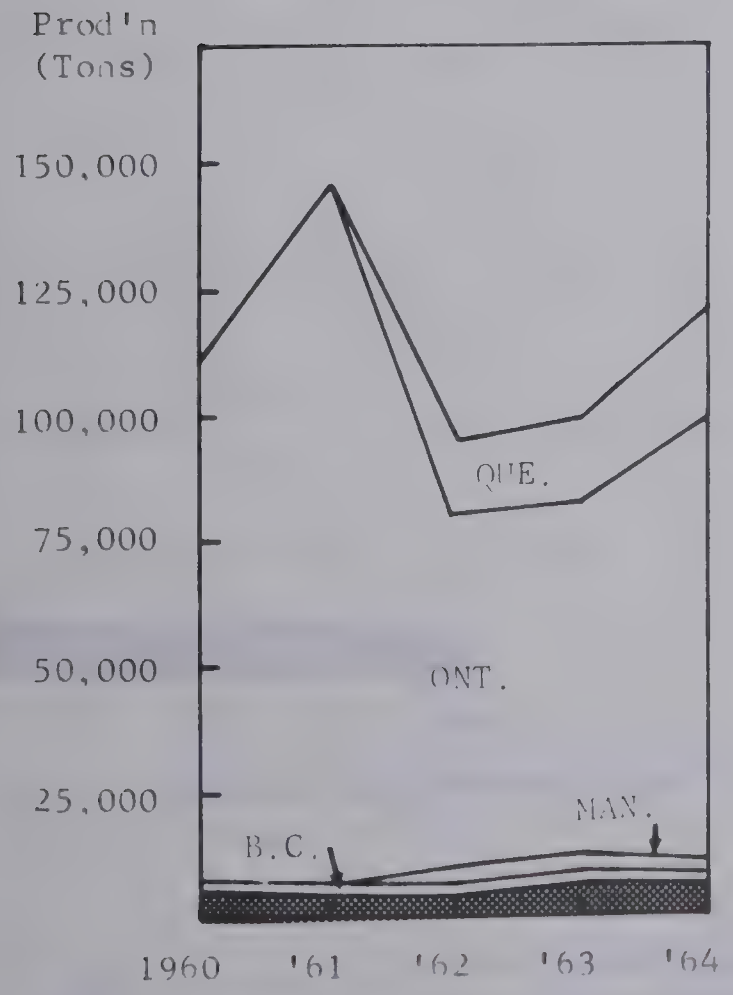
CARROTS



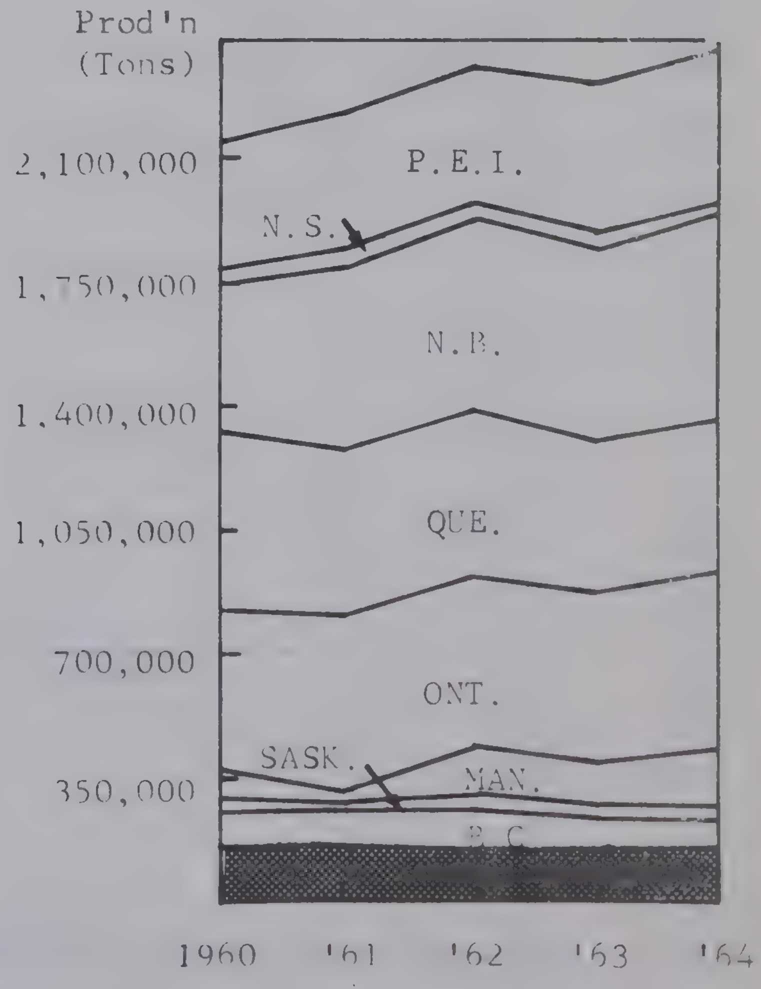
CORN (PROC.)
(N.B., N.S.)*



TURNIPS - (RUTABAGAS)
(N.B., N.S.)*

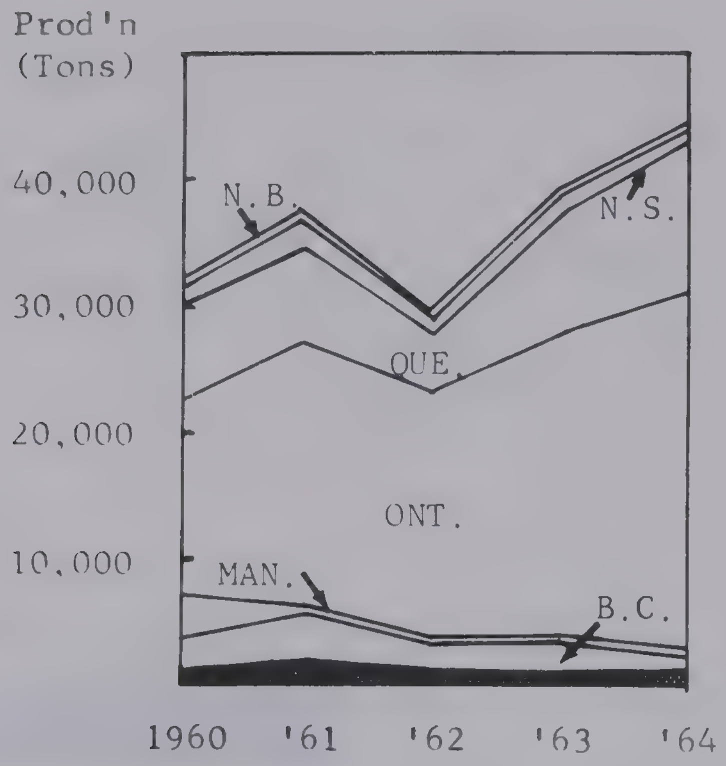


POTATOES

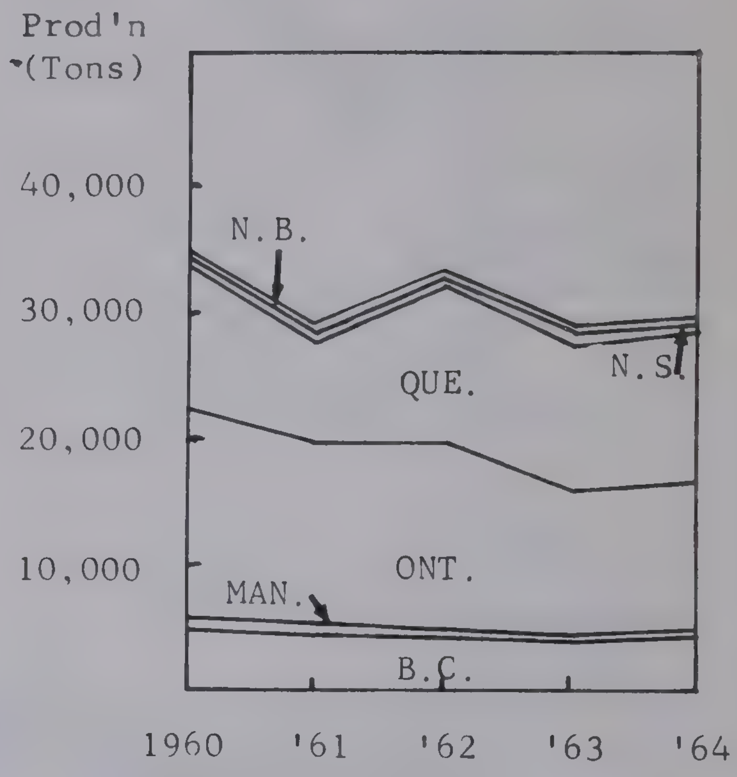


▨ Alberta production. * Negligible production.

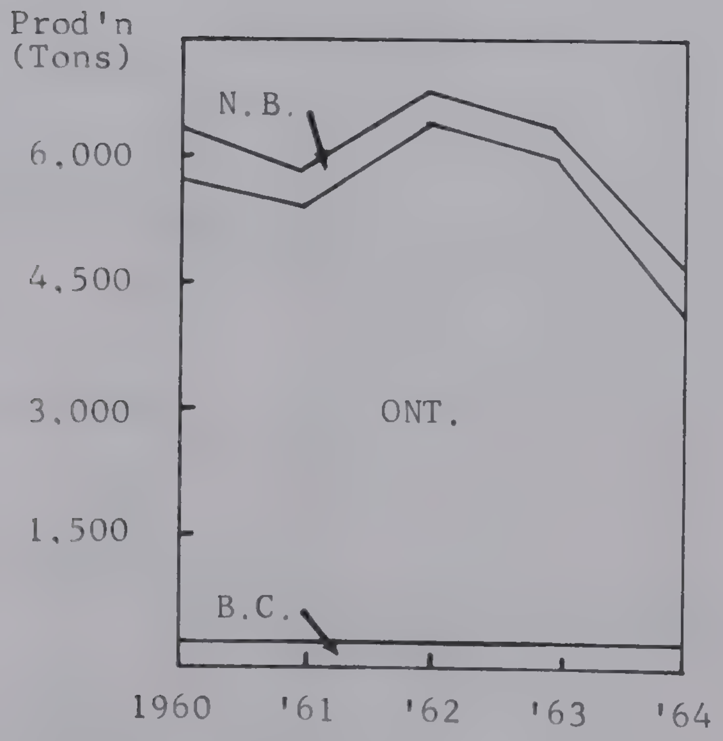
CANADIAN COMMERCIAL VEGETABLE PRODUCTION (Con't)



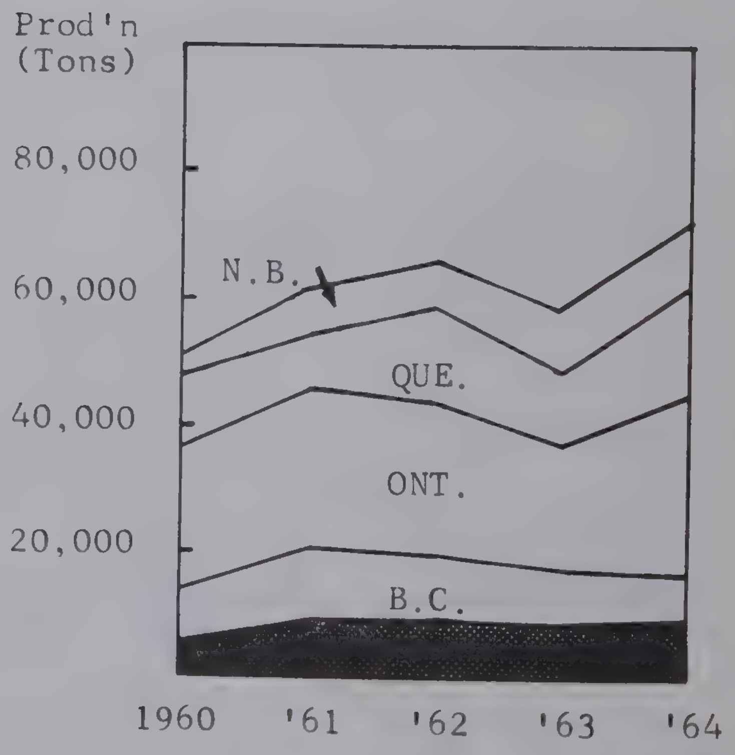
CUCUMBERS



LETTUCE
(Alta.)*



PARSNIPS
(Alta., Man., N.S., N.B.)*



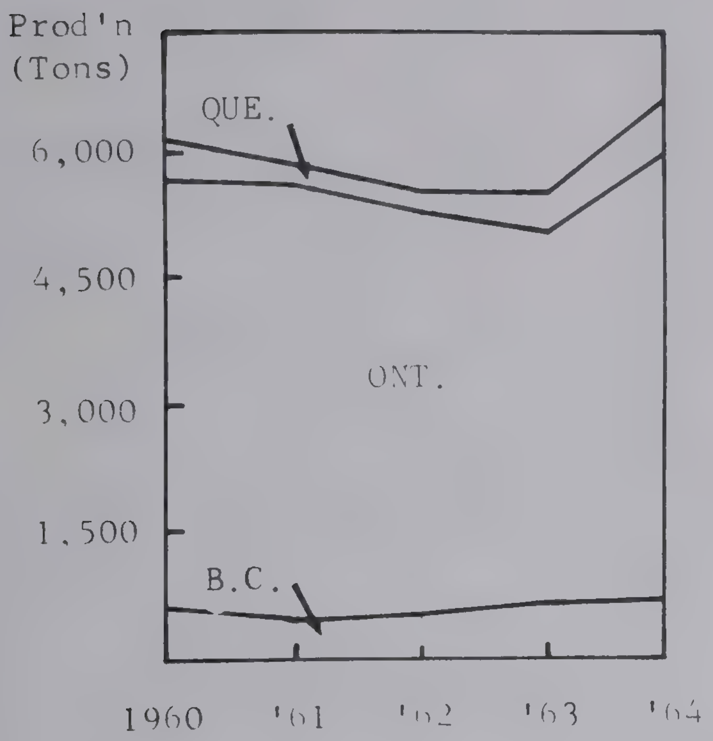
PEAS$^{3/}$

3/ Man. incl. with Alta.,
N.S. incl. with N.B.

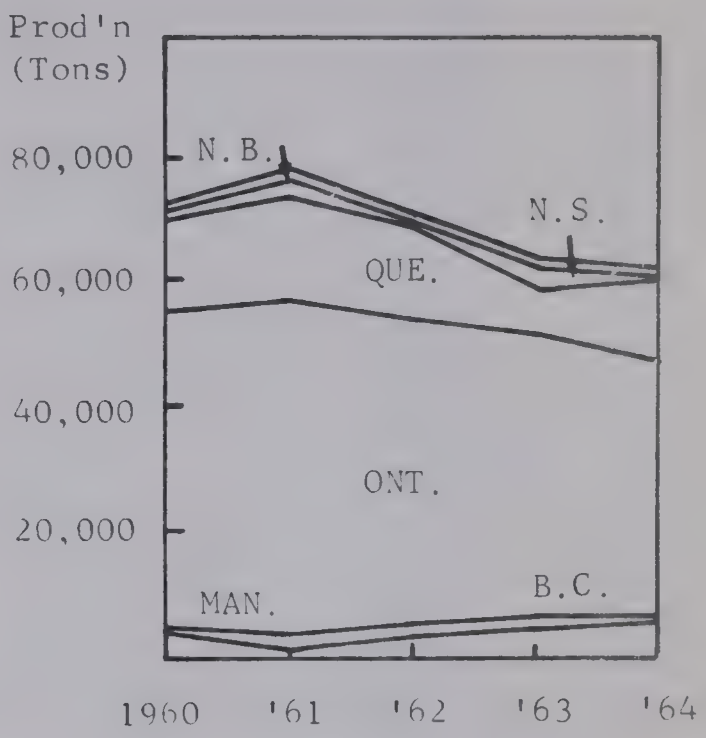
☐ Alberta production.   * Negligible production.

CANADIAN COMMERCIAL VEGETABLE PRODUCTION (Con't)

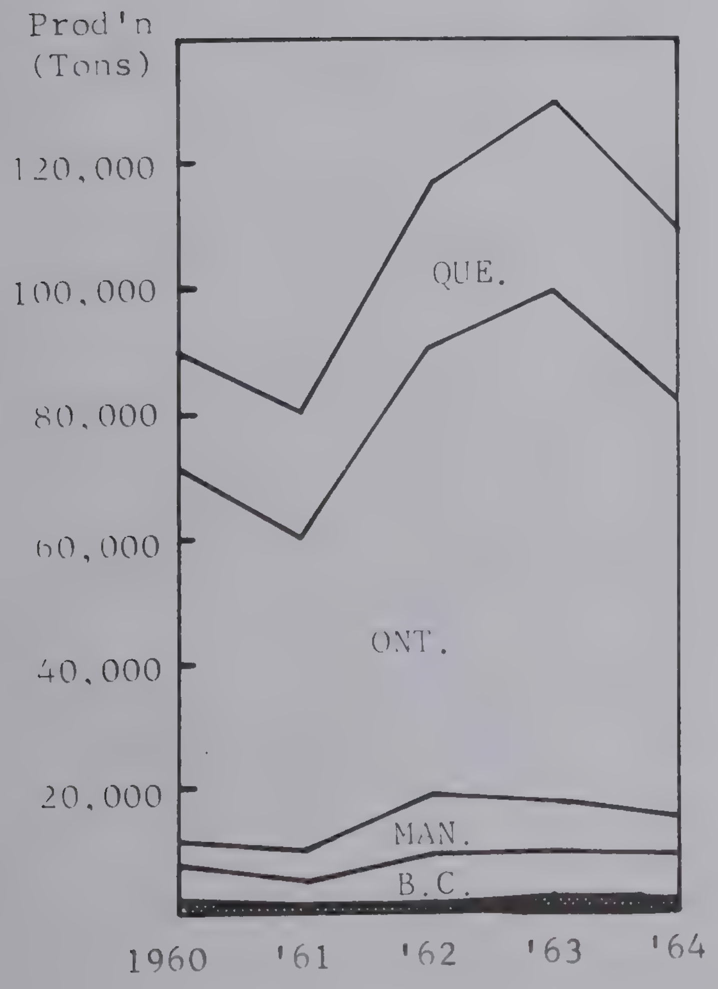
SPINACH
(Alta., Man.,
N.S., N.B.)*



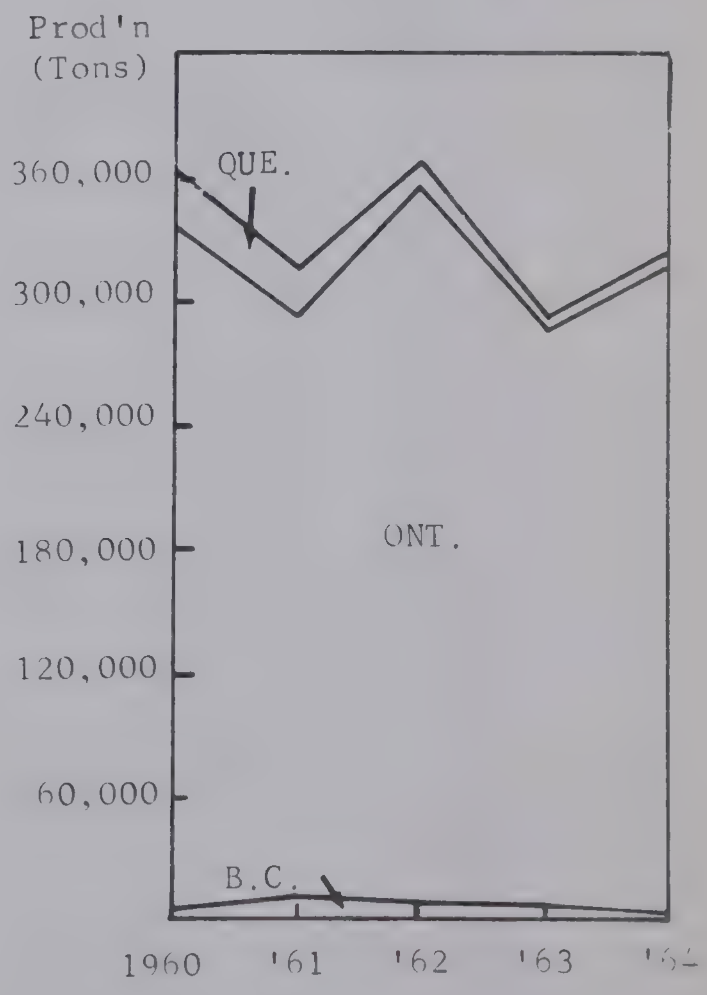
TOMATOES (FRESH)
(Alta.)



ONIONS
(N.S., N.B.)*



TOMATOES (PROC.)
(Alta., Man.,
N.B., N.S.)*



▨ Alberta production. * Negligible production.

TABLE 1

RECORDED CARLOT UNLOADS OF 15 MAJOR FRESH VEGETABLES IN ALBERTA - BY SOURCE[1]

(INCLUDING POTATOES)

Origin	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Alberta	83	679	856	981	1284	1488	1779	1749	1832	2006	2109	1783
Other Provs.	495	344	319	390	376	362	367	443	398	363	345	439
Foreign	1809	2120	1967	1966	2128	2384	2087	2167	2131	2044	2059	2279
TOTAL	2387	3143	3142	3337	3788	4234	4233	4359	4361	4413	4513	4501

TABLE 2

RECORDED CARLOT UNLOADS OF 15 MAJOR FRESH VEGETABLES IN ALBERTA - BY SOURCE[1]

(EXCLUDING POTATOES)

Origin	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Alberta	4	152	173	165	301	281	323	384	249	332	351	324
Other Provs.	342	268	267	327	301	296	300	363	337	327	300	284
Foreign	1551	1707	1770	1829	1902	2128	1940	1986	1941	1872	1886	2055
TOTAL	1397	2127	2210	2421	2504	2705	2563	2633	2527	2531	2537	2663

---

[1] Annual Unload Report - Fresh Fruits and Vegetables ... 12 Canadian Markets., C.D.A., Ottawa.

TABLE 3

CARLOT UNLOADS OF FRESH POTATOES IN ALBERTA - BY SOURCE[1/]

Origin	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965
Alberta	79	527	683	716	983	1207	1456	1465	1583	1674	1758	1459
Other Provs.	153	76	52	63	75	66	67	80	61	36	45	155
Foreign	258	413	197	137	226	256	147	181	190	172	173	224
TOTAL	490	1016	932	916	1284	1529	1670	1726	1834	1882	1976	1838

[1/] Annual Unload Report - Fresh Fruits and Vegetables ... 12 Canadian Markets. C.D.A., Ottawa.

MAJOR FRESH VEGETABLES IN ALBERTA

ADJUSTED TONNAGE OF UNLOADS - BY SOURCE

Ref: Carlot Unloads - Annual Unload Report, C.D.A.

Figure 1

FRESH VEGETABLES
(INCLUDING POTATOES)

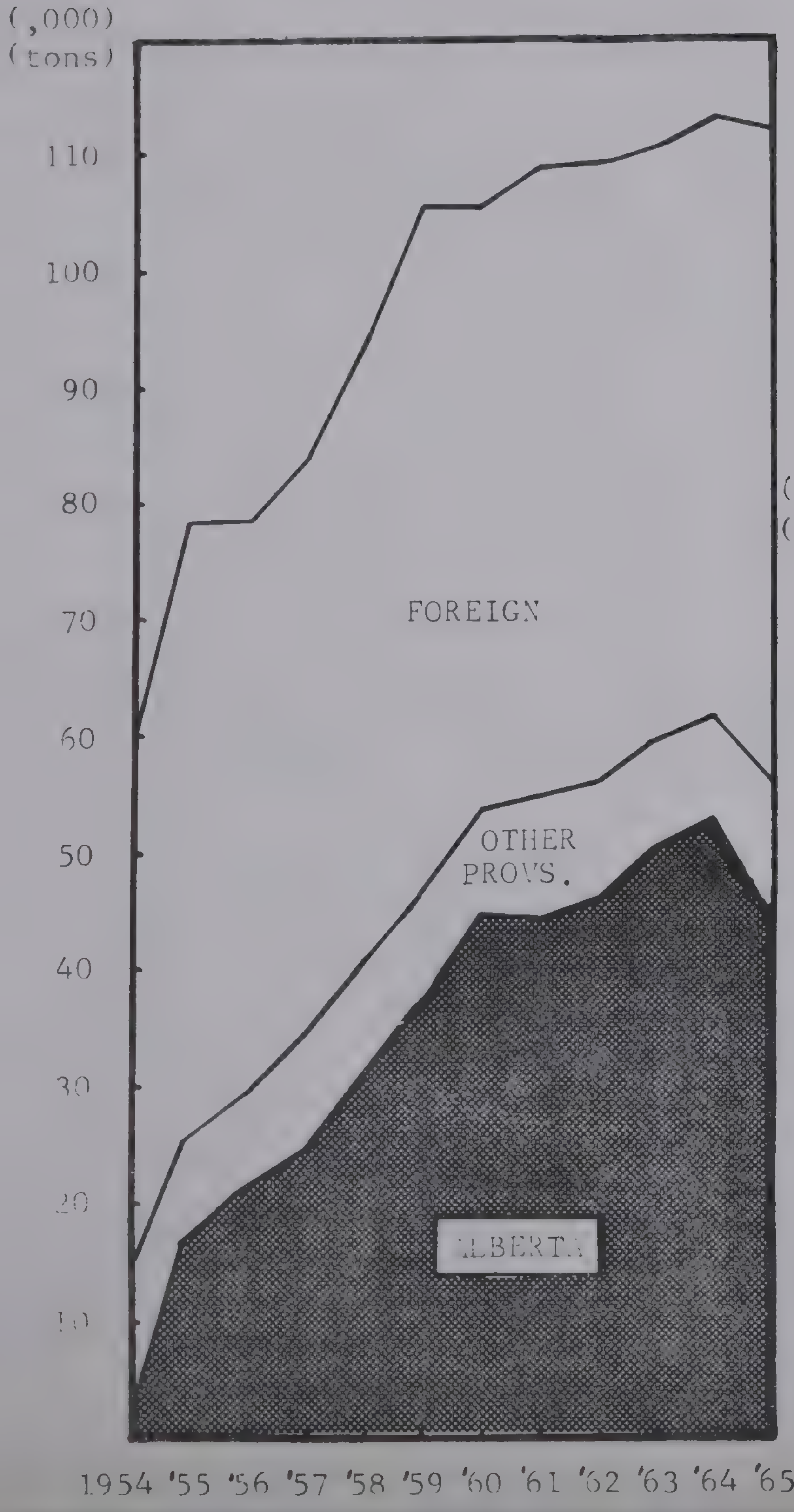


Figure 2

FRESH VEGETABLES
(EXCLUDING POTATOES)

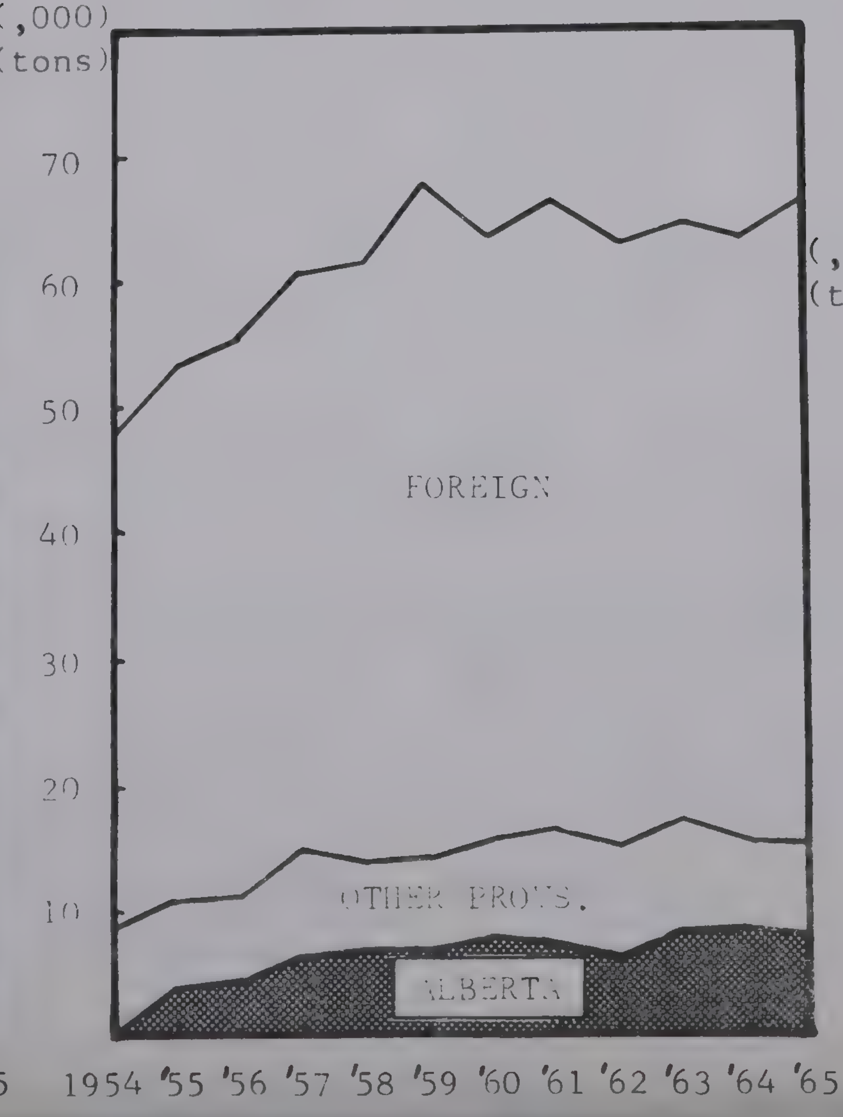


Figure 3

FRESH POTATOES

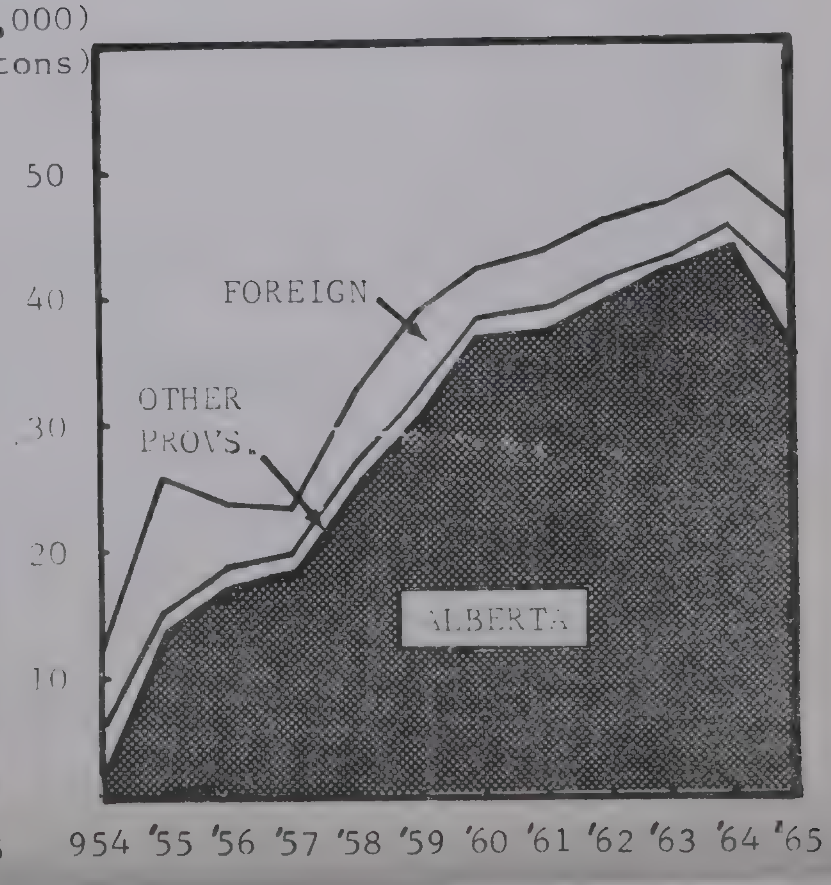


TABLE 4

APPARENT PER CAPITA DOMESTIC DISAPPEARANCE OF VEGETABLE FOOD IN CANADA[1]

	Pounds per Capita per Annum (fresh equivalent)			
	1962[2] (lbs)	1963[2] (lbs)	1964[3] (lbs)	3 - Yr. Average (lbs)
White potatoes				
Fresh	142.2	132.8	133.1	136.0
Processed	18.2	21.6	24.0	21.3
TOTAL, white potatoes	160.4	154.4	157.1	157.3
Tomatoes				
Fresh	16.8	13.4	14.2	14.8
Processed	42.8	47.8	40.4	43.7
TOTAL, tomatoes	59.6	61.2	54.6	58.5
Cabbage, fresh	9.1	9.0	8.2	8.7
Lettuce	8.7	7.9	8.3	8.3
Spinach, fresh	0.7	0.6	0.5	0.6
Carrots, fresh	16.0	14.4	14.4	14.9
Carrots, canned	1.5	0.9	1.6	1.3
Beans, fresh	2.1	1.1	0.9	1.3
Beans, canned	2.2	2.2	2.2	2.2
Beans, frozen	0.8	1.0	0.8	0.9
Peas, fresh	0.4	0.6	0.5	0.5
Peas, canned	4.3	3.9	4.1	4.1
Peas, frozen	1.4	2.0	2.1	1.8
Beets, fresh	3.8	1.3	1.5	2.2
Beets, canned	0.7	0.9	1.0	0.9
Cauliflower, fresh	1.7	1.8	1.7	1.7
Celery, fresh	6.0	6.1	5.9	6.0

Table 4 Con't. APPARENT PER CAPITA DOMESTIC DISAPPEARANCE OF VEGETABLE FOOD IN CANADA Con't[1]

	Pounds per Capita per Annum (fresh equivalent)			
	1962[2] (lbs)	1963[2] (lbs)	1964[3] (lbs)	3 - Yr. Average (lbs)
Corn, fresh	4.6	7.1	3.8	5.1
Corn, canned	10.5	10.2	9.6	10.0
Corn, fresh	0.6	1.9	2.0	1.5
Cucumbers, fresh	-	1.7	1.9	1.8
Onions, not processed	12.2	11.5	10.3	11.3
Asparagus, fresh	0.3	0.1	0.2	0.2
Asparagus, canned	0.5	0.5	0.3	0.4
Asparagus, frozen	0.04	0.1	0.1	0.1
Turnips, fresh	4.5	5.4	6.7	5.4
Mixed, fresh	5.3	2.3	1.5	3.0
Mixed, canned	2.5	0.9	1.7	1.7
Mixed, frozen	0.5	1.0	0.7	0.7
Otherwise used	14.0	8.2	13.3	11.8
TOTAL VEGETABLES (LBS)	334.94	320.2	317.5	324.2

	1962	1963	1964	3 - Yr. Average
Fresh	234.4	217.1	213.6	221.7
Canned & Processed	83.2	88.9	84.9	85.7
Frozen	3.3	6.0	5.7	5.0
Otherwise Used	14.0	8.2	13.3	11.8
TOTAL (LBS)	334.9	320.2	317.5	324.2

---

[1] Dominion Bureau of Statistics, Cat. No. 32-226.

[2] Revised figures.

[3] Subject to revision.

TABLE 5

APPARENT PER CAPITA DOMESTIC DISAPPEARANCE OF FOOD IN CANADA, AVERAGE 1955-57 and 1962-64[1]

(retail weight)

Commodity	1955-57	Distribution	1962-64	Distribution	Change 1962/64/ 1955-57
	(lbs)	(%)	(lbs)	(%)	(%)
Milk Products	459.8	32.6	390.8	29.5	-15.0
Fruit	188.8	13.4	182.1	13.8	- 3.6
Cereals	159.7	11.3	151.1	11.4	- 5.4
Potatoes	156.7	11.1	141.6	10.7	- 9.6
Meats	112.7	8.0	116.7	8.8	+ 3.5
Sugar & Syrups	110.7	7.8	109.8	8.3	- 0.8
Vegetables	97.0	6.9	98.0	7.4	+ 1.0
Oils & Fats	28.6	2.0	32.0	2.4	+11.9
Poultry	25.3	1.8	32.7	2.5	+29.2
Eggs	36.6	2.6	32.7	2.5	-10.7
Fish	13.4	0.9	13.9	1.1	+ 3.7
Beverages (tea & coffee)	10.7	0.8	11.8	0.9	+10.3
Pulses & Nuts	11.0	0.8	9.8	0.7	-10.9
TOTAL	1411.0	100.0	1323.0	100.0	- 6.2

---

[1] D. Ware, Resources & Development Division, Dept. of Finance, Ottawa.

Table 6

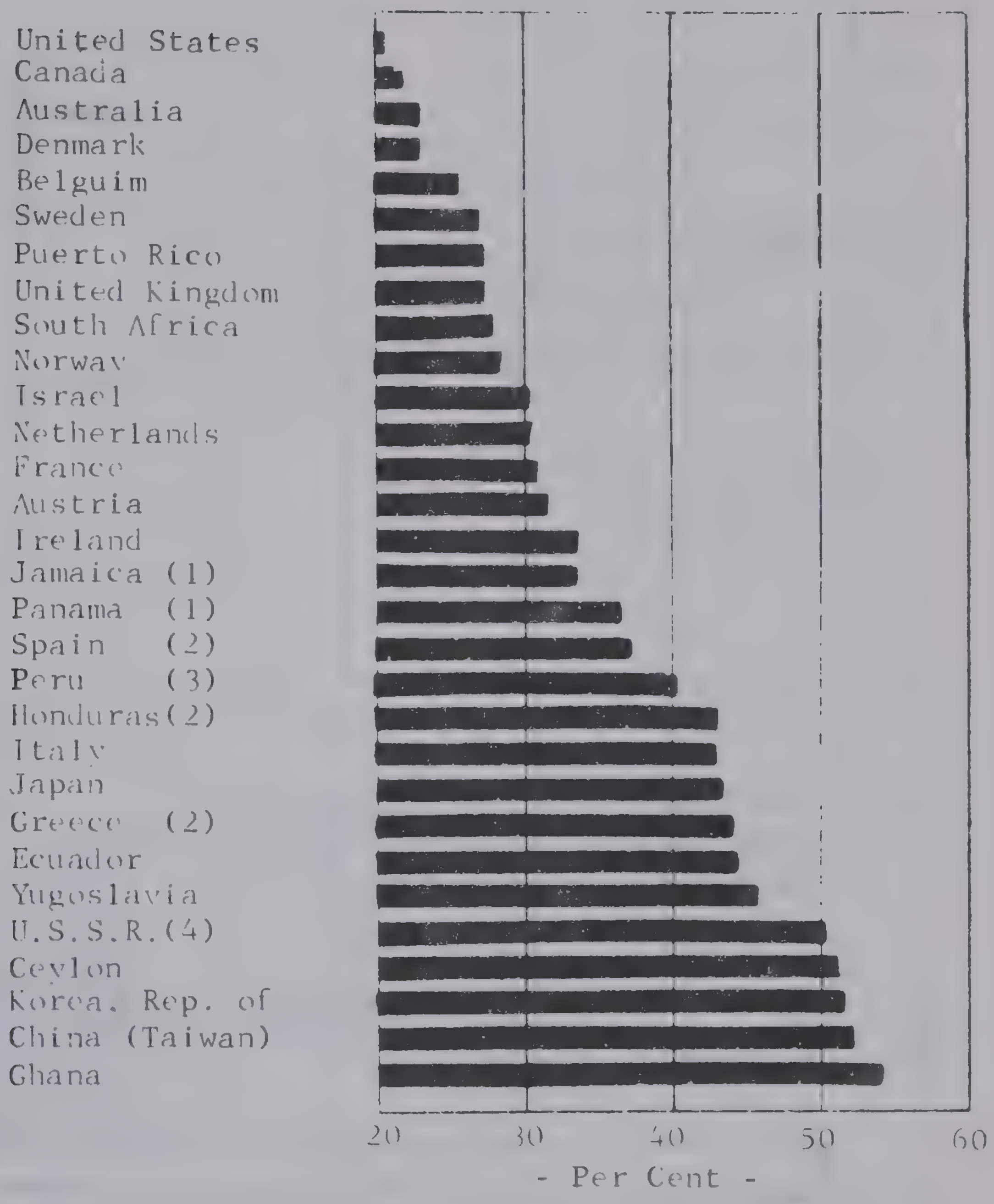
IMPORTANT PRODUCE ITEMS

Consumer preference for vegetables is shown in the arrangement below. A large international food retail organization has found that, over many years, its sales of fruit and vegetables on the American market are usually in the following order of importance. The 15 vegetables under study in this report comprise about 51% of the sales of vegetables listed here.

Commodity	% of Total
Potatoes	25.0
Bananas	7.0
Oranges	6.9
Apples	5.9
Lettuce	5.8
Watermelons	5.6
Grapefruit	4.1
Corn (Sweet)	2.1
Peaches	1.8
Sweet Potatoes & Yams	1.5
Pears	1.1
Lemons	1.0
Squash	1.0
Cucumbers	0.9
Radishes	0.8
Cauliflower	0.7
Onions (Green)	0.7
Snap Beans	0.6
Turnips	0.6
Greens	0.6
Strawberries	0.6
Melons (Misc.)	0.5
Peppers	0.5
Plums & Prunes	0.5
Asparagus	0.4
Broccoli	0.3
Avocados	0.3
Tangerines	0.3
Tomatoes	3.4
Onions (Dry)	3.4
Cabbage	2.9
Cantaloupes	2.8
Carrots	2.6
Celery	2.5
Grapes	2.2
Spinach	0.2
Pineapples	0.2
Beets	0.2
Berries (Misc.)	0.2
Apricots	0.2
Dates	0.2
Rhubarb	0.2
Rutabagas	0.1
Peas	0.1
Parsnips	0.1
Eggplant	0.1
Artichokes	0.1
Nectarines	0.1
Cherries	0.1
Coconuts	0.1
Okra	0.1
Brussels Sprouts	0.1
All other Veg.	0.5
All other Fruits	0.2
TOTAL - 54 Items	100.0

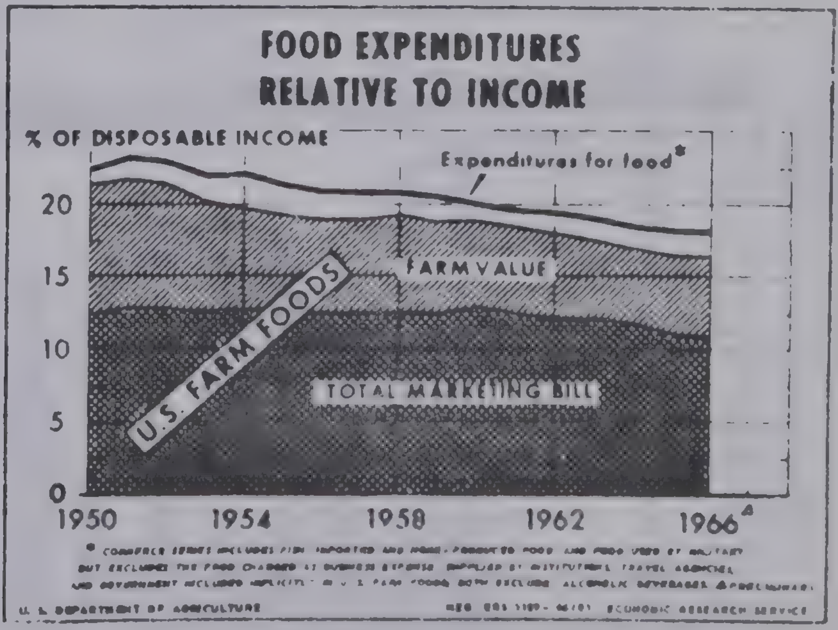
Figure 4

FOOD EXPENDITURES IN DIFFERENT COUNTRIES AS A PERCENT OF PERSONAL INCOME[1/]



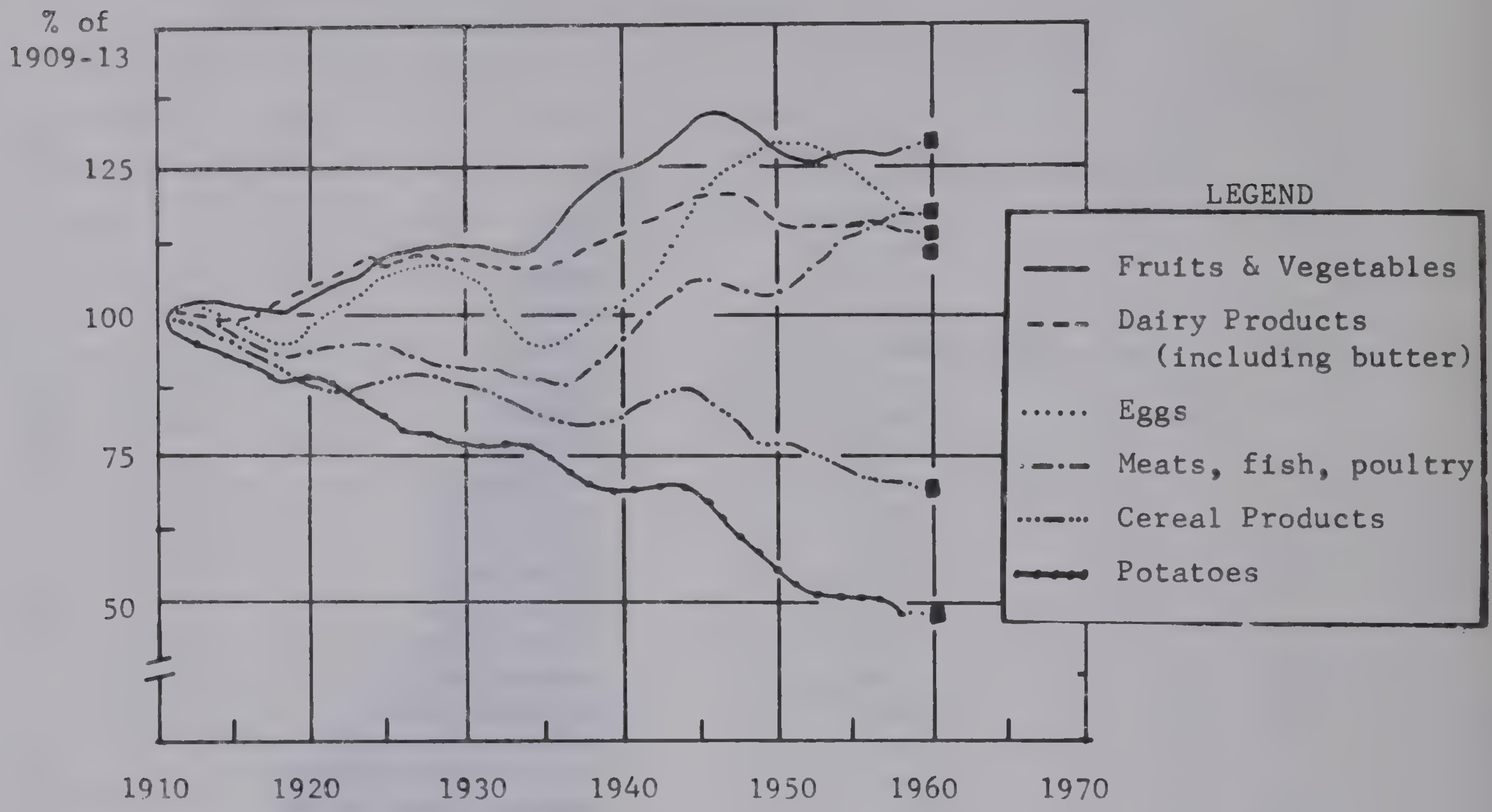
(1) 1961 (2) 1962 (3) 1959 (4) 1955

Figure 5



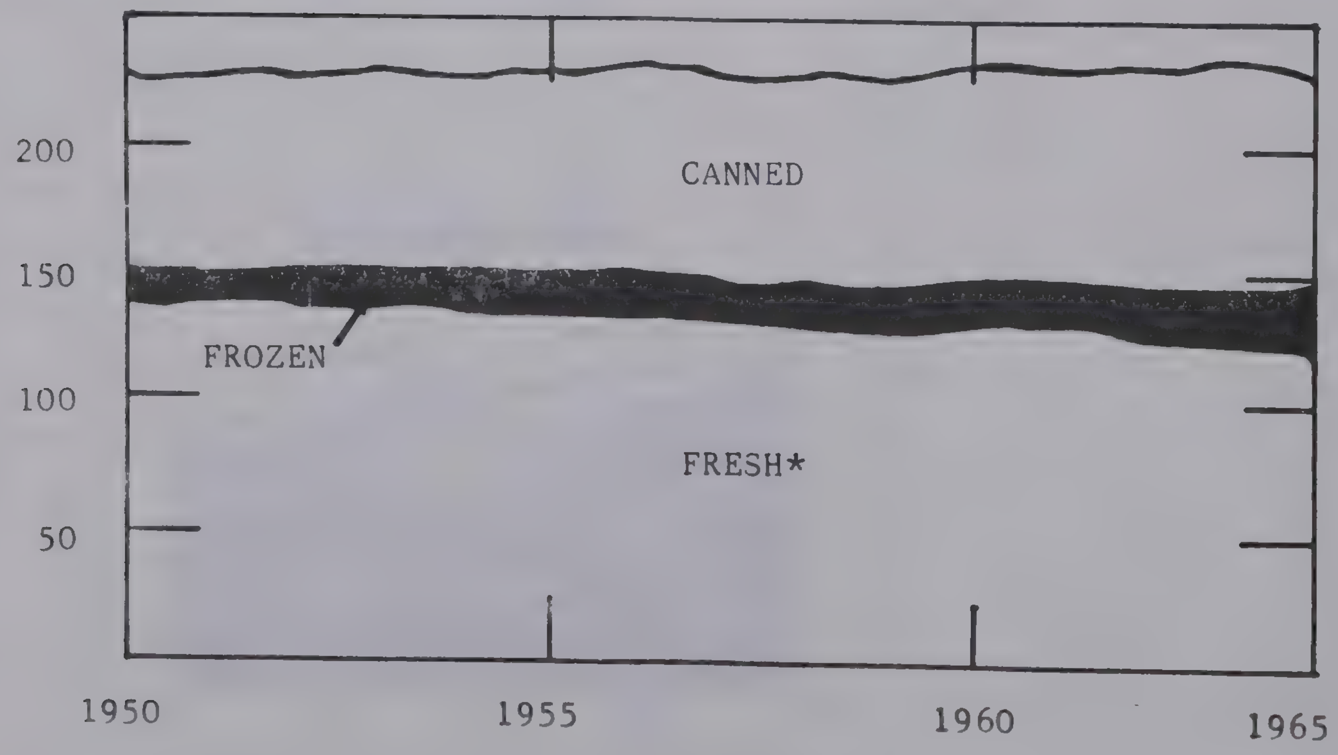
[1/] U.S.D.A., Washington., Economic Research Service, 1967.

Figure 6 TRENDS IN EATING HABITS[1/]



[1/] Per Capita civilian consumption, U.S.A. (using 1947-1949 retail prices as weights); 5-yr. moving average centered; Data for year 1960 shown by symbol.

Figure 7 USE OF VEGETABLES PER PERSON[1/]
(ABOUT STABLE SINCE 1950)



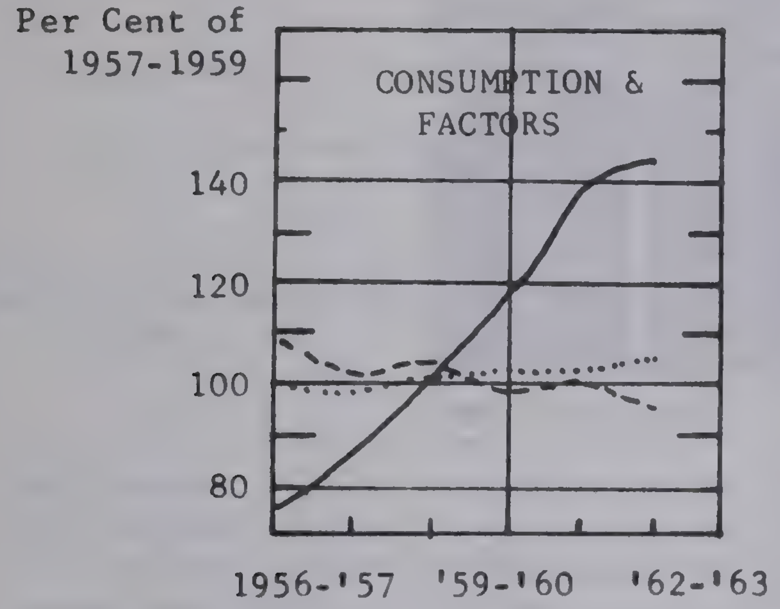
[1/] Civilain per capita consumption - fresh equivalent basis.

* Includes melons. Economic Research Service, U.S.D.A., Washington, 1967

CONSUMPTION OF PROCESSED POTATOES AND RELATED FACTORS[1]

UNITED STATES

Figure 8



[1] Potato Growers Association of California, 1964 Yearbook.

Figure 9

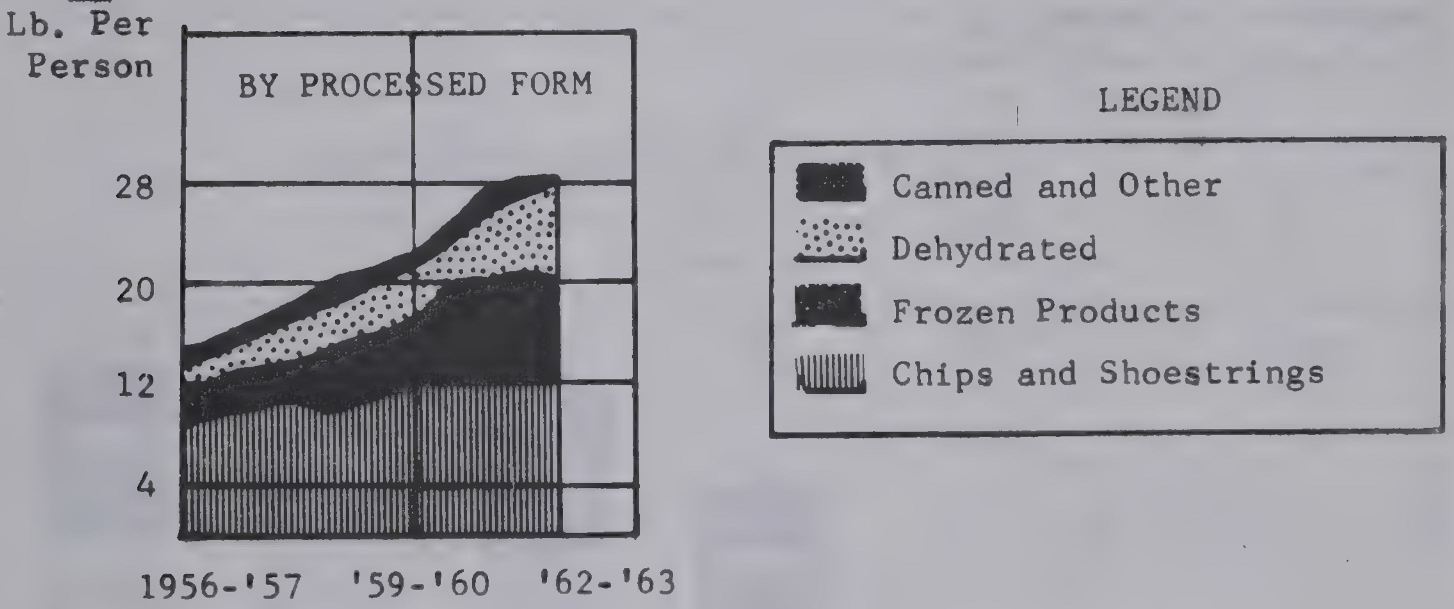
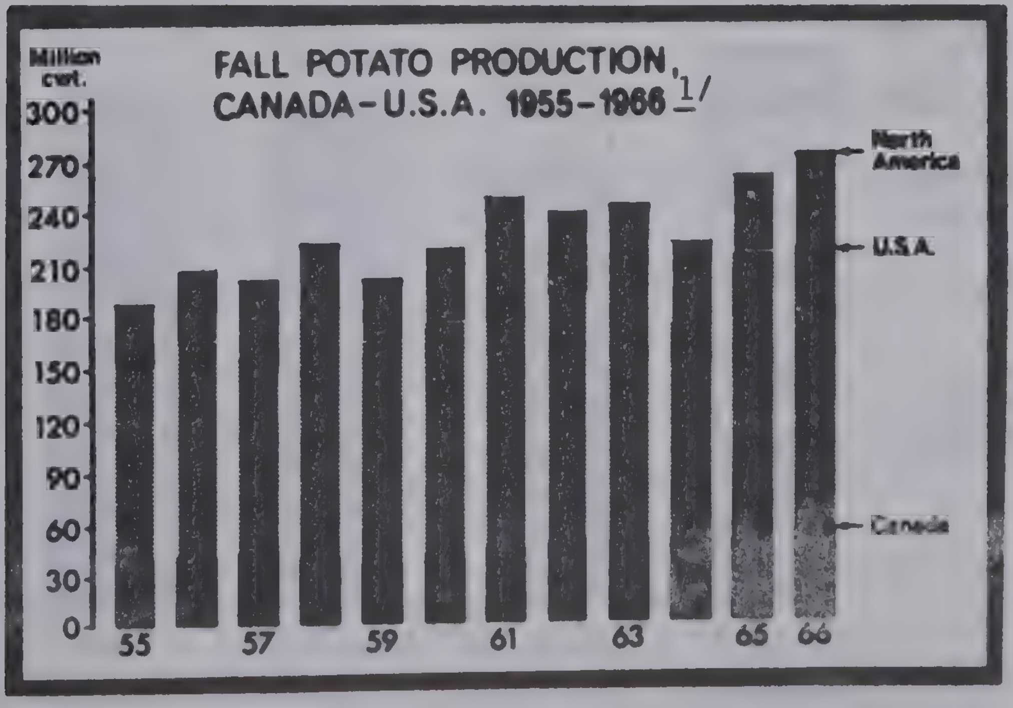
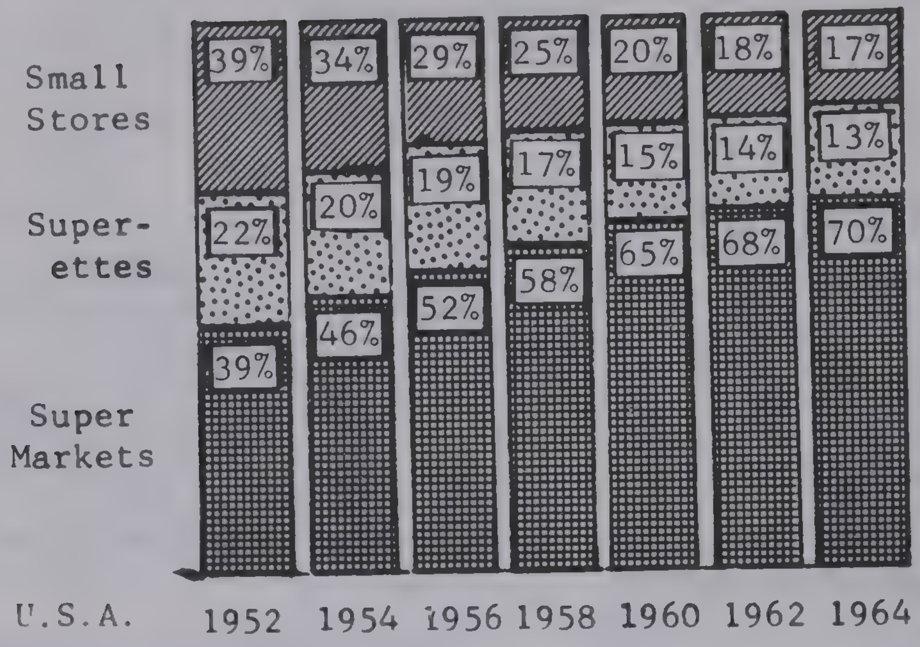


Figure 10



[1] Economic Research Service, U.S.D.A. Washington, 1967.

Figure 11 SHARE OF GROCERY STORE SALES BY SIZE OF STORE

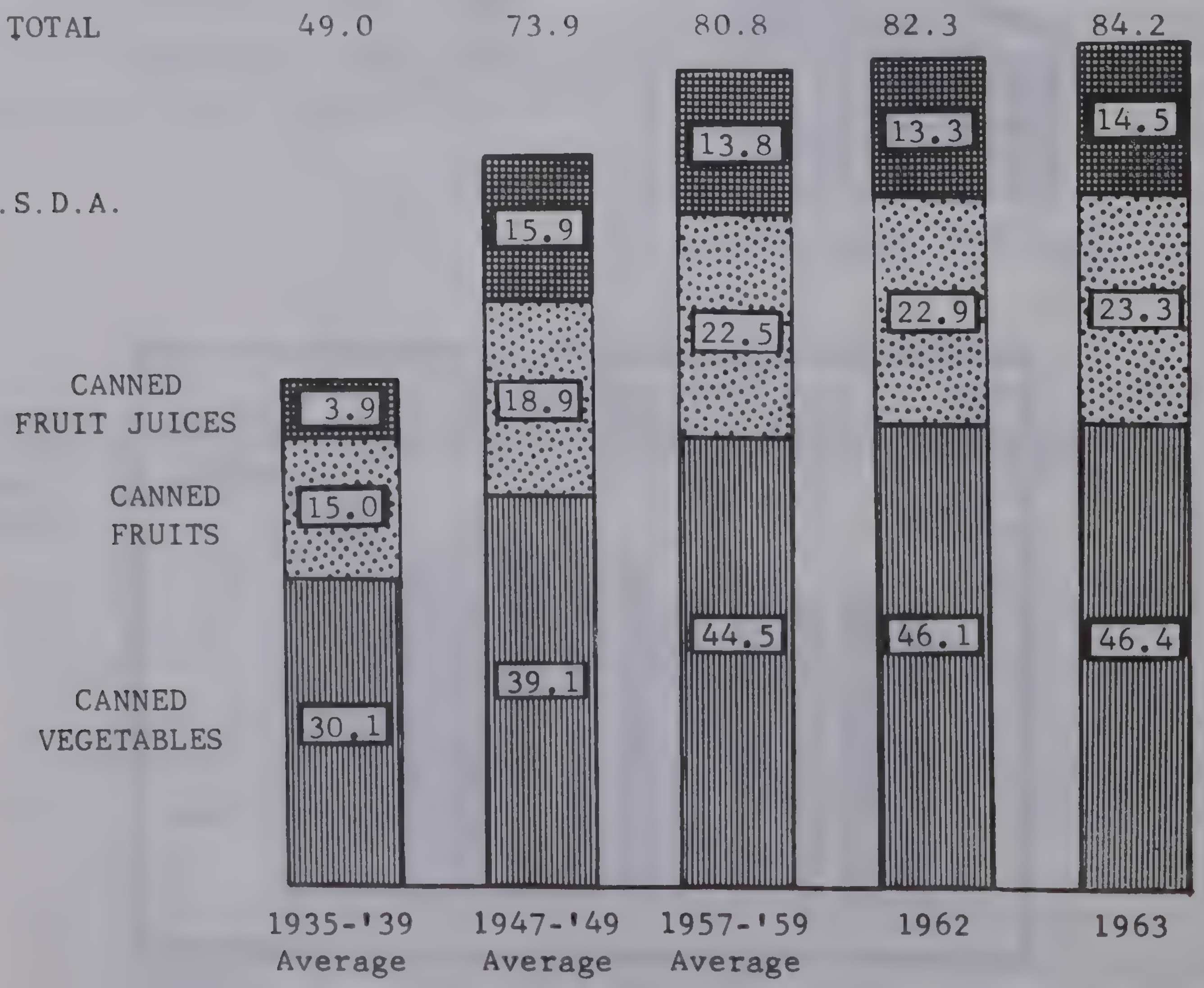


1/ Progressive Grocer Annual Report.

The trend in "share of sales" by size of store appears to be approaching stability. Where all stores (chain and independent) are classified by 3 volume sizes shown here, one sees that supermarket share is not at 70% of total sales. Over the years, the rapid growth in supermarkets share of sales was produced by extensive construction of new ones, by sharp reduction in number of small chain and independent stores and little or no mortality among supermarkets.

Figure 12 UNITED STATES PER CAPITA CONSUMPTION[1/]

Canned Fruits, Vegetables & Juices
(in lbs.)



1/ U.S.D.A.

TABLE 7

ESTIMATES OF THE FARM-RETAIL MARKETING BILL FOR DOMESTIC PRODUCED FOODS, CANADA, 1949-1964[1]

Year	Retail Value	Farm Value of Raw Food Materials	Farm-Retail Marketing Bill[2]	Farm Value as a % of Retail Value
		million $		per cent
1949	2,111	1,234	877	58
1950	2,247	1,292	955	57
1951	2,643	1,544	1,099	58
1952	2,759	1,554	1,205	56
1953	2,925	1,487	1,438	51
1954	2,930	1,481	1,449	51
1955	3,101	1,493	1,608	48
1956	3,313	1,562	1,751	47
1957	3,607	1,617	1,990	45
1958	3,880	1,735	2,145	45
1959	4,081	1,786	2,295	44
1960	4,300	1,760	2,540	41
1961	4,332	1,782	2,550	41
1962	4,573	1,924	2,649	42
1963	4,669	1,988	2,681	43
1964	5,029	2,043	2,986	41

---

[1] Sources: Based on Dominion Bureau of Statistics data;
Canadian Farm Economics, Vol. 1, No. 4, C.D.A.

[2] Note: The Farm Retail Bill is the total consumer expenditure for food.

TABLE 8

VALUE OF THE CANADIAN DOLLAR ON THREE COMPARATIVE BASES

1926, 1949 and 1957[1]

1926 = 100			1926 = 100	1949 = 100	1957 = 100
Year	Index	Year	Index	Index	Index
1926	100.0	1946	87.5	-	-
1927	101.3	1947	79.8	-	-
1928	101.6	1948	70.8	-	-
1929	100.4	1949	68.0	100.0	-
1930	103.0	1950	65.9	96.9	-
1931	109.5	1951	59.6	87.6	-
1932	120.8	1952	56.8	83.5	-
1933	123.2	1953	56.5	83.1	-
1934	121.6	1954	55.2	81.2	-
1935	121.0	1955	55.2	81.2	-
1936	117.2	1956	53.2	78.2	-
1937	114.1	1957	51.6	75.9	100.0
1938	114.3	1958	50.8	74.5	98.1
1939	115.1	1959	49.4	72.7	95.7
1940	110.0	1960	48.2	70.9	94.3
1941	101.9	1961	48.3	71.1	93.6
1942	97.5	1962	47.6	70.1	92.3
1943	94.2	1963	46.8	68.8	90.7
1944	91.4	1964	45.6	67.1	88.4
1945	89.4	1965	44.4	65.2	85.9

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[1] "Implicit Price Indexes", National Accounts - D.B.S.

TABLE 9

INDEXES OF PRODUCT PRICES - CANADA[1]

1949 - 1965

	Price Indexes					
Year	Farm Product Prices	Composite Purchases[2]	Farm Machinery	Farm Equip't & Materials	Wholesale[3] Farm Products	Wholesale[3] General
1949	100.0	100.0	100.0	100.0	100.0	100.0
1950	102.1	103.1	104.3	105.3	103.5	106.5
1951	116.2	112.7	118.0	114.3	117.5	121.1
1952	107.5	119.1	123.4	119.7	109.4	114.0
1953	98.1	117.5	124.3	115.0	96.9	111.3
1954	92.7	116.2	125.0	112.8	93.4	109.4
1955	91.1	116.8	125.6	113.5	93.0	110.4
1956	91.9	121.3	132.3	115.8	93.7	113.8
1957	91.7	125.4	141.4	117.2	93.4	114.7
1958	96.1	127.4	149.2	118.2	100.5	114.9
1959	96.9	132.1	156.6	121.5	97.9	116.3
1960	97.9	135.6	160.2	123.5	99.1	116.4
1961	102.3	138.3	164.7	125.4	101.0	117.6
1962	106.5	142.4	169.4	130.4	105.3	121.0
1963	105.1	146.3	172.4	131.7	103.3	123.8
1964	104.1	151.2	176.6	135.1	101.8	123.8
1965	106.5	157.7	180.0	137.2	106.2	126.2

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[1] D.B.S., Publication 62-002, 62-003, 11-502.
Canadian Farm Economics - April, 1965 - C.D.A.

[2] Prices of Commodities and Services bought by Farmers.

[3] Wholesale to Retail Price Indexes.

TABLE 10

INDEXES OF PRICES IN CONSUMPTION AND PRODUCTION - CANADA[1]

1949 - 1965

	Price Indexes					
Year	Wholesale[2] Vegetable Produce	Consumer Food	Consumer Vegetables Fresh	Consumer Cost of Living	Wholesale[2] Farm Products	Farm Product Prices
1949	100.0	100.0	100.0	100.0	100.0	100.0
1950	106.1	102.6	-	102.9	103.5	102.1
1951	167.3	117.0	-	113.7	117.5	116.2
1952	110.4	116.8	-	116.5	109.4	107.5
1953	104.5	112.6	-	115.5	96.6	98.1
1954	103.3	112.2	-	116.2	93.4	92.7
1955	102.4	112.2	-	116.4	93.0	91.1
1956	103.6	113.4	-	118.1	93.7	91.9
1957	103.4	118.6	-	121.9	93.4	91.7
1958	104.0	122.1	-	125.1	100.5	96.1
1959	104.7	121.1	-	126.5	97.9	96.9
1960	106.6	122.2	140.0	128.0	99.1	97.9
1961	106.6	124.0	129.3	129.2	101.0	102.3
1962	111.1	126.2	141.9	130.7	105.3	106.5
1963	119.6	130.3	145.7	133.0	103.3	105.1
1964	117.2	132.4	153.2	135.4	101,8	104.1
1965	114.7	139.6	161.7	140.8	106.2	106.5

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[1] D.B.S., Publications 62-002, 62-003, 11-502.
Canadian Farm Economics - April, 1965 - C.D.A.

[2] Wholesale to Retail Price Index.

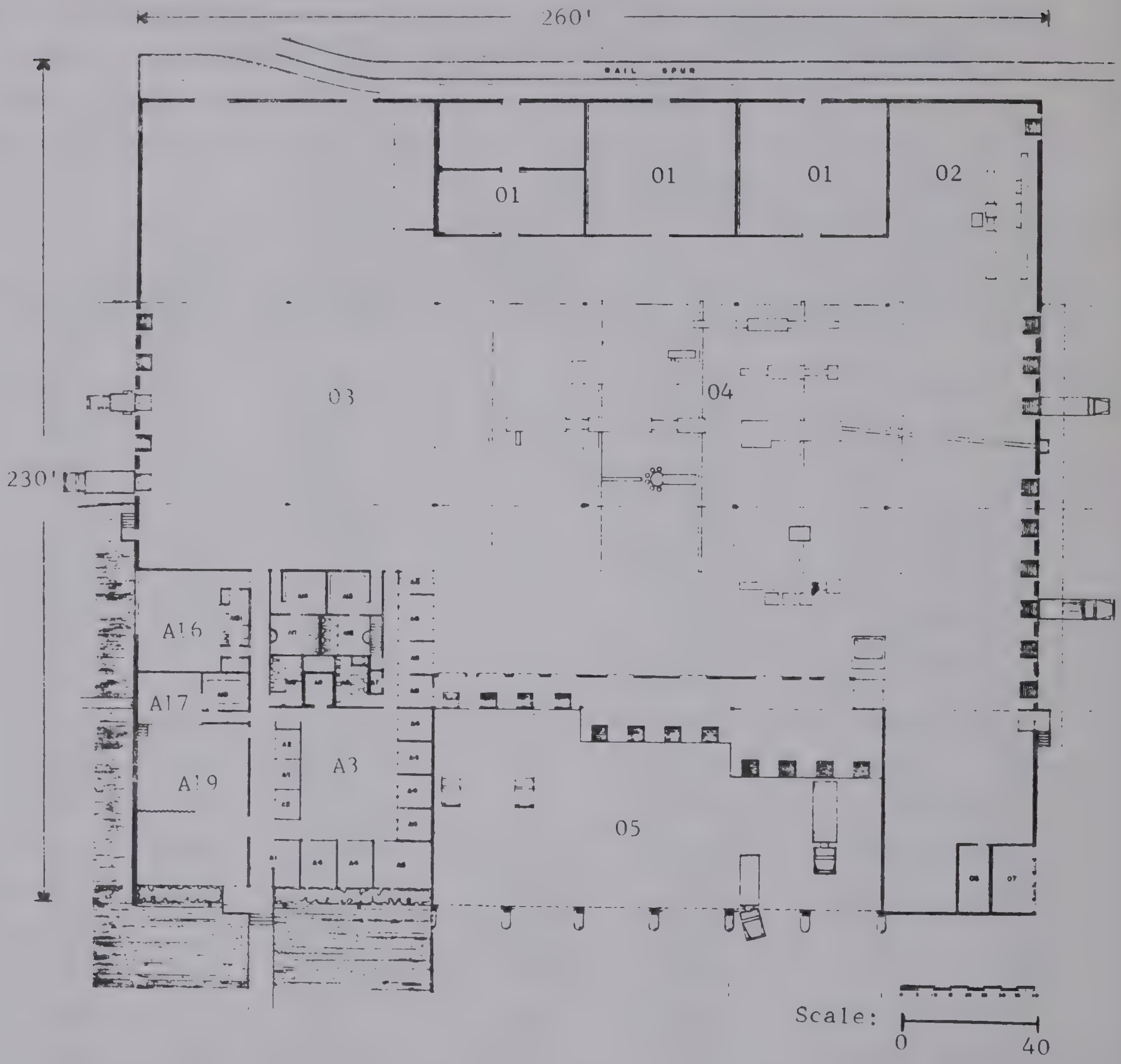
SAMPLE GROWER INVESTMENT

The following table contains sample list prices of machinery in Alberta and some of the basic costs per hour used in this study. In reference to the assigned costs, many of the machines are used for only a very short time each year; therefore, the charge for depreciation and interest on investment per hour is necessarily high.

TABLE 11

Equipment		List Price	Cost per Hour of Use
		$	$
Tractor	- 25 h.p. gas	3.500	1.17
	- 35 h.p. gas	5.100	1.69
	- 45 h.p. diesel	7.100	1.93
	- 55 h.p. diesel	7,300	2.14
	- 65 h.p. diesel	8.800	2.32
Plow	- 3 furrow	860	0.84
	- 4 furrow	1,200	1.19
Harrow	- 24 ft.	500	0.78
Planter	- small seeds 2 row	1.450	3.96
	- potatoes 4 row	5,300	11.33
Row Cultivator	- 4 row	1,000	0.50
	- 2 row	650	0.58
Sprayer	- 8 row	600	2.68
Sprinkler	- hand-move ½ mi.	6.750	2.77
	- hand-move ¼ mi.	4.000	2.00
Harvester	- carrot 1 row	5.000	8.63
	- potato 1 row mt. & trac.	9,700	7.50
	- potato 2 row mt. & trac.	22.000	17.50
Windrower	- 2 row	3.000	11.64
Bulk Box	- 14 ft.	1,000	1.01
	- 18 ft.	1.350	1.36
Piler	- 18 in. to 8 ft.	2,000	2.29
Spudnik		4.000	2.37
Grader	- 21 in.	2.800	2.13
Washer		1.800	1.45
Inspection Table	- 21 in.	1,400	0.44
Dryer	- 21 in.	1.600	1.28
Dumper		650	0.44
Carrot Line		6,700	6.23
Pallet box hinged		20	3.40(/yr.)
Mobile hoist Hand electric		2.500	1.06

Figure 13: Floor Plan of a Large Mixed Vegetable[1] Storage & Packing Plant



Legend:

A1	Reception	A9	Vault	A18	Kitchen
A2	Sales Office	A10	Men Washroom	A19	Auditorium
A3	General Office	A11	Men Washroom	01	Cooler
A4	Administration Office	A12	Women Washroom	02	Hydrocooler
A5	Conference	A13	Women Lockers	03	Warehousing
A6	Shipping and Receiving Office	A14	Men Lockers	04	Processing
		A15	Kitchen Area	05	Truck Door
A7	Janitor	A16	Cafeteria	06	Switch room
A8	Women Washroom	A17	Stage	07	Transformer Vault.

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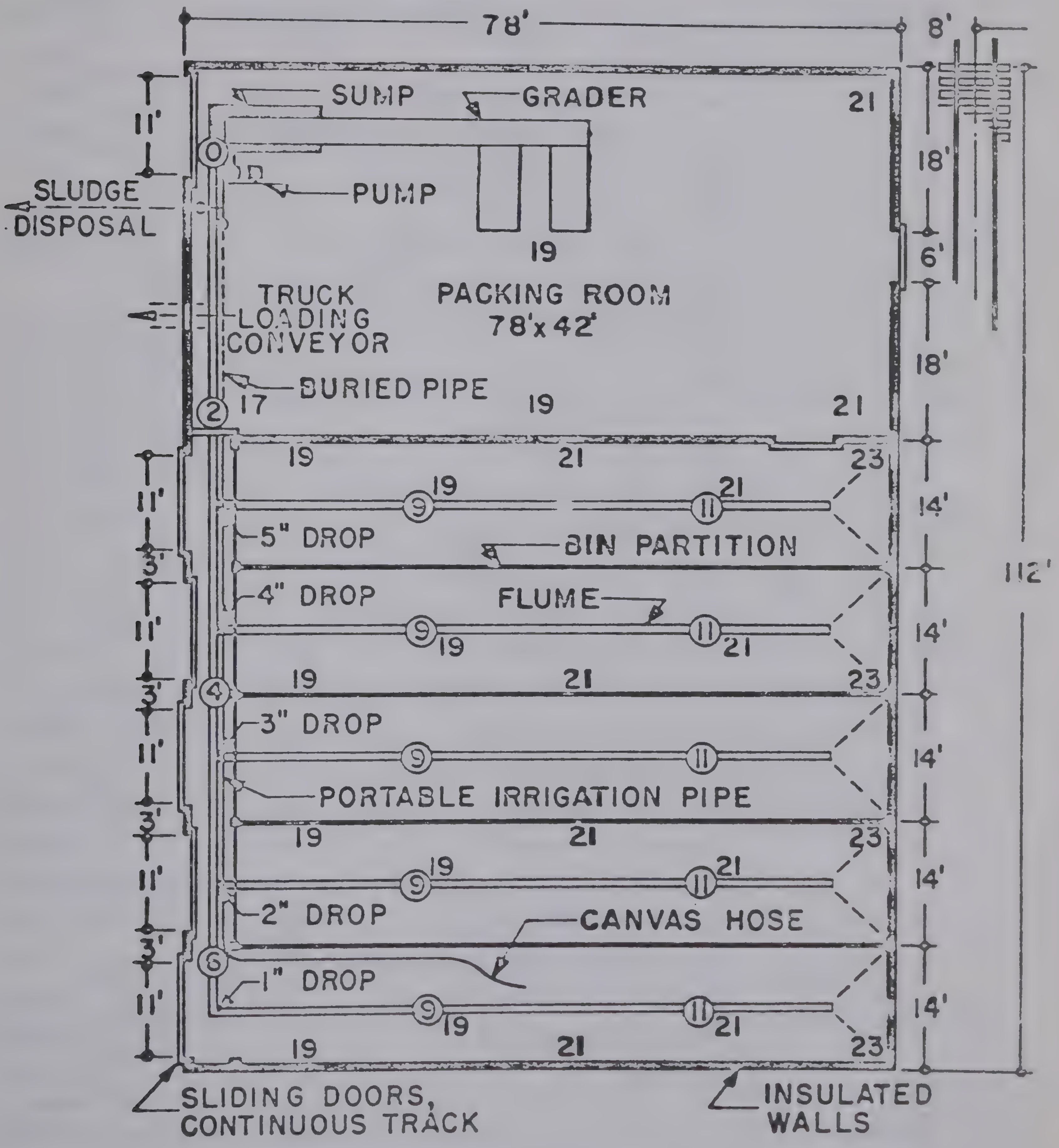
[1] Courtesy of Gardeners Sales Ltd., Winnipeg, Manitoba.

Figure 14: Flume layout with five 9,000-bushel bins. Elevations of flume bottom (circled numbers) and floor (uncircled numbers) are shown at 30-foot intervals and are measured in inches above the flume bottom at outlet to sump. Corresponding elevations are the same in each of the five bins where the floor slopes to and with the flume. Bin flumes drop one to five inches into the main flume. Portable irrigation pipe carries water to a canvas hose to wash potatoes from the front of pile into the flume.



Source: United States Department of Agriculture.

TABLE 12

APPROXIMATE PRICES FOR POTATO PLANT EQUIPMENT - 1967

20,000 - 30,000 Ton Output (1 Shift)

Quantity	Item	Price
1	12" Mud Pump	420
1	24" x 22' Elevator (mesh chain)	1,300
1	36" x 13 Roll Brush Roll-over Washer	3,000
1	36" x 5' Sizer Feed Conveyor	470
1	36" x 5' Screen Sizer	1,000
1	36" Standard Grading Table	4,000
1	Two Tables (included in grading table price)	
1	36" 12 Roll Dryer Unit	1,900
1	Live Roll Feed Unit	400
1	A & E Sizer Unit	3,700
1	48" x 26' Recheck	2,500
1	18" x 32' Two & Cull Return	1,200
1	48" x 12 Station Bagger	3,000
1	24" x 6 Station Bagger	1,000
1	20" x 28' Sack Conveyor w/incline	1,400
1	23 Ton Cull Hopper	2,000
1	20" x 12' Feed Conveyor	500
1	5 Station Sizer Unit	13,000
6	Sizer Gross Conveyors	2,200
5	Auto Box Fillers	5,800
4	Take-out Conveyors	2,200
1	Take-away and Integrator Conveyor w/vibrator	1,000
1	Dial Scale Unit	420
1	Station Sack Hanger & Jigger Unit	420
1	12" x 27' Cull Conveyor	1,100
41	Motors (various H.P.)	7,000
	DELIVERY	1,500
TOTAL		62,430

Table 13 SAMPLE HANDLING CHARGES - WESTERN CANADA

Vegetable			Charge per Unit
Asparagus			.15¢/25 lb.
Beans			.15¢/25 lb.
Beets	- bunched	7-1/2¢ doz.	.15¢/ 2 doz.
Broccoli			.15¢/20 lb.
Brussels Sprouts			.15¢/25 lb.
Cabbage			.15¢/50 lb.
Cauliflower		1 doz	.15¢/crate
Celery		condition slips-stalks	.15¢/crate (35 stalks)
Citron			.15¢/50 lb.
Corn		2-½¢ doz. or /6 doz.	.15¢/bag
Cucumber			.15¢/25 lb.
Carrots	- bunched		.15¢/crate (2 doz.)
Dill Weed		.01¢ lb	/bundle (20 lb.)
Egg Plant			.15¢/25 lb.
Endive			.15¢/case (2 doz.)
Garlic			.15¢/50 lb.
Leeks		½¢ lb.	/case
Lettuce	- head		.15¢/case (2 doz.)
	leaf		.15¢/case (3 doz.)
Onions	- bunched	1-1/2¢ doz.	/10 doz.
Parsley			.15¢/ 5 doz.
Peas			.15¢/25 lb.
Peppers	- green		.15¢/25 lb.
	red		.15¢/20 lb.
Pumpkin			.15¢/50 lb.
Radish	- bunched	.02¢ doz.	/ 8 doz.
	bulk	1/2¢ lb.	/30 lb.
Rubarb			.15¢/25 lb.
Spinach			.15¢/case (20 lb.)
Squash			.15¢/50 lb.
Tomatoes			.15¢/28 lb. or 6/5's
Vegetable Marrows			.15¢/50 lb.

Sales Brokerage & Assembly Charges - shall be charged to pools.

Table 14 SAMPLE OF CHARGES FOR PREPARATION AND HANDLING

Commission Charges for Vegetables

Potatoes	(75# - .15¢)	$ 4.00/ton
Turnips & Onions	(50# - .12½)	$ 5.00/ton
Beets, Carrots, Parsnips & Cabbage	(50# - .15¢)	$ 6.00/ton

Washing and Grading Charges

	0-5% Grade Out	5.1-10% Add	10.1-15% Add	15.1-20% Add	20.1-25% Add	Over 25% Custom Basis
Beets	8.00	2.00	3.00	4.00	5.00	
Carrots	12.00/ton					
Turnips	6.50	1.50	2.25	3.00	4.00	
Parsnips	24.00	2.00	3.00	4.00	5.00	

(Percentages determined by using the difference between receiving weight and graded out weight as a % of receiving weight)

(Grading charges are to be based on graded weight)

Charges for Out-Going Pallets & Pallet Bins

Pallets out	3.50
Pallet return	3.50
Pallet bins out	15.00
Pallet bins return - grower	14.00
Pallet bins return - wholesaler	15.00
Cabbage crates out	.90
Cabbage crates return	.70
Celery out	1.10
Celery return	1.00
Tomato out	.40
Tomato return	.30

Table 15

WHOLESALE TRADE - SALARIES & HOURS OF WORK

As of October 1, 1965

Salary Rate Per Week

Locality	Standard Hrs./Wk.	Cashier, Male		Cashier, Female		Counter Salesman	
		Aver.	Predominant Range	Aver.	Predominant Range	Aver.	Predominant Range
		$	$	$	$	$	$
Halifax	40.9	-	-	54	-	70	52 - 91
Moncton	40.5	-	-	-	-	66	60 - 75
Montreal	41.9	87	60 -111	66	50 - 81	84	62 -100
London	43.3	81	-	50	43 - 55	81	70 - 96
Ottawa	43.3	-	-	68	55 - 80	81	60 -100
Toronto	41.1	89	70 -107	73	55 - 90	92	65 -120
Winnipeg	40.8	77	50 - 98	62	43 - 80	72	51 - 92
Regina	40.2	-	-	78	-	69	55 - 81
Calgary	40.8	-	-	68	-	78	63 -102
Edmonton	41.6	-	-	54	48 - 65	72	46 - 95
Vancouver	39.4	94	-	69	52 - 86	88	65 -110

		Order Filler, Male		Order Filler, Female		Packer	
Halifax	40.9	60	42 - 78	-	-	50	42 - 60
Moncton	40.5	55	50 - 63	-	-	54	45 - 66
Montreal	41.9	66	48 - 84	45	35 - 62	56	40 - 76
London	43.3	71	55 - 85	51	44 - 52	72	56 - 83
Ottawa	43.3	72	55 - 89	46	-	71	55 -101
Toronto	41.1	80	60 -102	52	41 - 65	68	50 - 86
Winnipeg	40.8	69	51 - 98	41	36 - 46	58	44 - 68
Regina	40.2	66	44 -102	49	38 - 60	60	47 - 69
Calgary	40.8	66	53 - 78	56	44 - 75	62	48 - 78
Edmonton	41.6	67	46 -102	49	40 - 57	57	44 - 73
Vancouver	39.4	86	63 -105	67	45 - 86	78	55 -100

		Receiver		Truck Driver		Warehouseman	
Halifax	40.9	64	45 - 95	68	49 - 77	62	46 - 80
Moncton	40.5	63	50 - 71	61	48 - 84	76	50 -104
Montreal	41.9	74	52 - 98	83	63 -104	72	45 -100
London	43.3	73	58 - 86	86	67 -104	74	50 - 99
Ottawa	43.3	76	55 - 94	83	55 -101	79	60 - 89
Toronto	41.1	81	60 -104	94	65 -119	79	58 -101
Winnipeg	40.8	68	46 - 86	71	48 -103	67	52 - 82
Regina	40.2	70	48 - 93	84	55 -103	75	52 -102
Calgary	40.8	70	58 - 85	78	55 -103	75	60 - 94
Edmonton	41.6	70	51 - 88	77	51 -104	67	51 - 85
Vancouver	39.4	87	65 -106	97	69 -114	87	62 -104

Table 16 TRUCK TRANSPORTATION - WAGES & HOURS OF WORK

As of October 1, 1965

Wage Rate Per Hour

Locality	Standard Hrs./Wk.	Checker		Dispatcher		Freight Handler	
		Aver.	Predominant Range	Aver.	Predominant Range	Aver.	Predominant Range
		$	$	$	$	$	$
Halifax	43.0	-	-	1.83	-	-	-
Montreal	49.6	1.83	1.75-1.90	2.18	1.80-2.55	1.75	1.59-1.82
London	46.2	1.99	-	2.11	-	1.90	-
Ottawa	49.0	1.99	1.95-2.04	2.13	-	1.86	1.79-2.00
Toronto	46.7	2.01	1.99-2.04	2.40	1.98-2.84	1.91	1.85-2.00
Winnipeg	44.9	1.60	1.35-1.88	2.01	1.67-2.44	1.69	1.60-1.82
Regina	44.5	-	-	-	-	-	-
Calgary	42.4	1.87	1.77-2.02	2.41	2.05-2.74	1.87	1.65-2.10
Edmonton	45.0	1.76	1.73-1.77	2.54	1.88-3.00	1.67	1.39-1.98
Vancouver	41.1	2.56	2.58-2.65	3.01	2.60-3.46	2.55	2.40-2.65

		Mechanic Auto.		Truck Driver's Helper		Warehouseman	
Halifax	43.0	-	-	1.28	1.25-1.35	-	-
Montreal	49.6	2.08	1.85-2.23	1.63	1.49-1.81	1.71	1.49-1.87
London	46.2	2.26	-	1.78	1.57-1.90	-	-
Ottawa	49.0	2.17	2.00-2.29	1.48	1.25-1.80	1.79	-
Toronto	46.7	2.30	2.24-2.49	1.72	1.55-1.97	1.84	1.78-2.00
Winnipeg	44.9	1.93	1.75-2.08	1.47	1.37-1.60	1.73	1.63-1.79
Regina	44.5	-	-	-	-	-	-
Calgary	42.4	-	-	1.69	1.65-1.73	1.98	1.74-2.42
Edmonton	45.0	2.14	1.80-2.50	1.45	1.30-1.50	1.86	1.70-2.00
Vancouver	41.1	2.85	2.58-3.17	2.44	1.95-2.56	2.56	2.53-2.63

		Truck Driver Light & Heavy		Truck Driver Long Distance 1/	
Halifax	43.0	1.42	1.35-1.50	-	-
Montreal	49.6	1.84	1.72-1.93	142	96-180
London	46.2	1.94	1.79-2.00	149	120-185
Ottawa	49.0	1.94	1.80-2.00	135	105-162
Toronto	46.7	1.99	1.89-2.10	143	102-181
Winnipeg	44.9	1.53	1.25-1.78	120	92-158
Regina	44.5	1.67	1.40-1.80	128	85-147
Calgary	42.4	2.03	1.70-2.42	144	100-173
Edmonton	45.0	1.70	1.60-1.80	154	115-191
Vancouver	41.1	2.60	2.53-2.68	169	109-211

1/ Earnings per week, mileage basis.

Table 17 RETAIL TRADE (GROCERY AND PRODUCE STORES) - [1]

SALARIES AND HOURS OF WORK

As of October 1, 1965

Salary Rate Per Week

Locality	Average Standard Hrs./Wk.	Checker-Cashier Female		Grocery Clerk, Self Serv., Male		Produce Clerk, (Fruit), Male	
		Aver.	Predominant Range	Aver.	Predominant Range	Aver.	Predominant Range
		$	$	$	$	$	$
Halifax	40.5	48	37 - 65	61	49 - 81	72	54 - 88
Moncton	42.3	53	37 - 63	63	40 - 81	68	40 - 88
Montreal	40.7	61	50 - 65	73	62 - 85	71	50 - 85
London	40.6	75	65 - 86	89	77 -101	87	77 - 95
Ottawa	40.6	66	52 - 79	80	60 - 94	78	60 - 94
Toronto	40.3	74	65 - 83	85	70 - 99	84	72 - 96
Winnipeg	40.1	67	57 - 70	74	52 - 80	80	79 - 88
Regina	40.0	64	59 - 66	61	42 - 83	77	74 - 83
Calgary	40.1	74	64 - 78	88	74 - 92	94	92 - 96
Edmonton	40.0	74	64 - 78	87	68 - 92	88	74 - 92
Vancouver	40.0	78	64 - 86	97	74 -106	102	84 -114

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[1] Wage Rates, Salaries and Hours of Labor; Annual Report N. 48, October 1965. Surveys Division, Economics and Research Branch, Department of Labor, Ottawa.

The Application of Freight Rates

Freight rates, applied to vegetables, are usually of two types - Class rates and Commodity rates. The first one is a straight mileage rate. The second is a lower rate which is applied when significant carlot movement of produce has been established, or when truck transport rates force an adjustment of rail rates, or when it is felt that incentive rates will stimulate traffic.

The Rail Freight Tables, No.'s 18 to 21[1], list rates for fresh vegetables from certain shipping points to destinations. The Vauxhall and Winnipeg tables exemplify Commodity rates. It may be seen that reverse hauls do not bear the same rates, and the minimum carlot weights are different. In certain schedules, heat and frost protection are excluded.

Transportation cost is an important element in setting the limits of a market area to vegetable growers. Mileage and carlot weights form the basis of charges. Therefore, it is in the interest of the shipper who wishes to extend his market area to ship high-value packaged produce rather than bulk produce.

An Alberta grower-shipper will probably examine his market prospects in terms of his costs of production. In considering the "F.O.B. wholesale price" at destination, he will add freight charges per cwt. in order to calculate his profit margin. While a profit above total costs is to be desired at all times, temporarily he may find it advantageous to move produce into markets from a production cost basis somewhere between Cash Costs and Total Costs.

Appendix Schedules 1 to 7, Appendix Tables 18 and 21, and Schedules 8 and 9 , pages 113 and 114 in the main text, can be used for approximate calculations to arrive at the combined effect of cost of production, freight charges and, if necessary, the tariff charges per hundredweight or per carlot for shipments of fresh vegetables from different locations.

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[1] Perodically revised.

Schedule 1

VEGETABLE PRODUCTION COSTS - CONDENSED [1/]

SOUTHERN ALBERTA - IRRIGATION

	Asparagus Per Acre	Beets Per Acre	Cabbage Per Acre	Bulk Carrots Per Acre
Gross Yield (lbs.)	3,000	20,000	20,000	24,000
Net Yield (lbs.)	2,400 @ $0.19	16.000 @ $0.025	16,000 @ $0.03	20,000 @ $0.04
Receipts:	$ 456	$ 400	$ 480	$ 800
Expenses:				
Seed or Transplants	$ 30	$ 10	$ 2	$ 9
Fertilizer & Chemicals	21	38	31	52
Containers	40	64	64	124
Miscellaneous	5	3	4	3
Land & Water Charges	16	16	16	16
Cultural Operations	31	37	53	45
Harvesting	220	81	83	121
Store, Grade & Sell	2/	98	90	315
TOTAL COST	$ 363	$ 347	$ 343	$ 683
CASH COST	(83%) $ 303	(73%) $ 255	(84%) $ 291	(56%) $ 384

1/ A Grower's Guide to Vegetable Production Costs, 1968. Economics Division.

2/ Included in the operation above.

Schedule 2

VEGETABLE PRODUCTION COSTS - CONDENSED 1/
SOUTHERN ALBERTA - IRRIGATION

	Poly Carrots Per Acre	Cauliflower Per Acre	Celery Per Acre	Sweet Corn Per Acre
Gross Yield (lbs.)	24,000	14,000	30,000	9,000
Net Yield (lbs.)	20,000 @ $0.06	10,000 @ $0.065	24,000 @ $0.065	7,000 @ $0.035
Receipts:	$ 1,200	$ 650	$ 1,560	$ 245
Expenses:				
Seed or Transplants	$ 9	$ 100	$ 300	$ 7
Fertilizer & Chemicals	52	25	71	16
Containers	180	80	300	21
Miscellaneous	3	5	5	3
Land & Water Charges	16	16	16	16
Cultural Operations	45	72	106	29
Harvesting	121	181	383	95
Store, Grade & Sell	435	2/	2/	2/
TOTAL COST	$ 861	$ 479	$ 1,181	$ 187
CASH COST	(55%) $ 477	(90%) $ 436	(96%) $ 1,137	(84%) $ 158

1/ A Grower's Guide to Vegetable Production Costs, 1968. Economics Division.

2/ Included in the operation above.

Schedule 3

VEGETABLE PRODUCTION COSTS - CONDENSED [1/]

SOUTHERN ALBERTA - IRRIGATION

	Cucumbers Per Acre	Lettuce Per Acre	Onions Per Acre	Bulk Parsnips Per Acre
Gross Yield (lbs.)	20,000	20.000	25,000	20,000
Net Yield (lbs.)	10.000 @ $0.03 (pickles)	16.000 @ $0.05	20,000 @ $0.04	12,000 @ $0.06
Receipts:	10.000 @ $0.06 (fresh)			
	$ 900	$ 800	$ 800	$ 720
Expenses:				
Seed	$ 7	$ 6	$ 20	$ 5
Fertilizer & Chemicals	26	36	42	42
Containers	100	104	80	106
Miscellaneous	5	5	3	3
Land & Water Charges	16	16	16	16
Cultural Operations	58	55	56	43
Harvesting	530	256	115	105
Store. Grade & Sell	2/	76	180	284
TOTAL COST	$ 742	$ 554	$ 512	$ 604
CASH COST	(93%) $ 695	(92%) $ 514	(69%) $ 355	(56%) $ 339

1/ A Grower's Guide to Vegetable Production Costs, 1968. Economics Division.

2/ Included in the operation above.

Schedule 4

VEGETABLE PRODUCTION COSTS - CONDENSED [1/]

SOUTHERN ALBERTA - IRRIGATION

	Poly Parsnips Per Acre	Potatoes Per Acre	Tomatoes Per Acre	Turnips - (Rutabagas) Per Acre
Gross Yield (lbs.)	20,000	20,000	20,000	30,000
Net Yield (lbs.)	6,000 @ $0.06	16,000 @ $0.0225	12,000 @ $0.08	18,000 @ $0.035
	6,000 @ $0.12			
Receipts:	$ 360	$ 360	$ 960	$ 630
	$ 720			
Expenses:				
Seed	$ 5	$ 36	$ 100	$ 2
Fertilizer & Chemicals	52	24	33	36
Containers	153	24	120	115
Miscellaneous	3	4	141	3
Land & Water Charges	16	16	16	16
Cultural Operations	43	42	180	50
Harvesting	105	45	549	106
Store, Grade & Sell	368	106	2/	243
TOTAL COST	$ 745	$ 297	$1,139	$ 571
CASH COST	(62%) $ 460	(75%) $ 225	(87%) $1,001	(57%) $ 328

[1/] A Grower's Guide to Vegetable Production Costs, 1968. Economics Division.
[2/] Included in the operation above.

Schedule 5

VEGETABLE PRODUCTION COSTS - CONDENSED 1/

ALBERTA - DRYLAND

	Asparagus Per Acre	Beets Per Acre	Cabbage Per Acre	Bulk Carrots Per Acre
Gross Yield (lbs.)	3,000	16,000	16,000	18,000
Net Yield (lbs.)	2,000 @ $0.19	12.000 @ $0.025	12,000 @ $0.03	12,000 @ $0.045
Receipts:	$ 380	$ 300	$ 360	$ 480
Expenses:				
Seed or Transplants	$ 90	$ 10	$ 2	$ 9
Fertilizer & Chemicals	17	27	20	47
Containers	32	48	48	90
Miscellaneous	3	3	4	3
Land Charges	7	7	7	7
Cultural Operations	20	33	46	30
Harvest	193	61	66	102
Store, Grade, Sell	2/	74	68	183
TOTAL COSTS	$ 302	$ 262	$ 261	$ 471
CASH COSTS	(84%) $ 254	(74%) $ 195	(84%) $ 221	(56%) $ 265

1/ A Grower's Guide to Vegetable Production Costs, 1968. Economics Division.

2/ Included in the operation above.

Schedule 6

VEGETABLE PRODUCTION COSTS - CONDENSED[1/]

ALBERTA - DRYLAND

	Poly Carrots Per Acre	Cauliflower Per Acre	Cucumbers Per Acre	Lettuce Per Acre
Gross Yield (lbs.)	18,000	12,000	14,000	15,000
Net Yield (lbs.)	12.000 @ $0.06	8,000 @ $0.065	6,000 @ $0.06	10,000 @ $0.05
Receipts:	$ 720	$ 520	$ 360	$ 500
Expenses:				
Seed or Transplants	$ 9	$ 100	$ 7	$ 6
Fertilizer & Chemicals	47	21	17	26
Containers	145	64	60	65
Miscellaneous	3	3	3	3
Land Charges	7	7	7	7
Cultural Operations	30	65	48	45
Harvest	102	147	198	221
Store, Grade, Sell	255	2/	2/	2/
TOTAL COSTS	$ 598	$ 407	$ 340	$ 373
CASH COSTS	(62%) $ 371	(92%) $ 376	(93%) $ 317	(92%) $ 344

[1/] A Grower's Guide to Vegetable Production Costs, 1968. Economics Division.

[2/] Included in the operation above.

Schedule 7

VEGETABLE PRODUCTION COSTS - CONDENSED [1]

ALBERTA - DRYLAND

	Bulk Parsnips Per Acre	Poly Parsnips Per Acre	Potatoes Per Acre	Turnips - (Rutabagas) Per Acre
Gross Yield (lbs.)	15,000	15.000	16,000	20,000
Net Yield (lbs.)	10.000 @ $0.06	5.000 @ $0.06 5.000 @ $0.12	10.000 @ $0.0225	12,000 @ $0.035
Receipts:	$ 600	$ 300 $ 600	$ 225	$ 420
Expenses:				
Seed or Transplants	$ 5	$ 5	$ 30	$ 2
Fertilizer & Chemicals	34	44	23	32
Containers	68	103	20	76
Miscellaneous	2	2	2	2
Land Charges	7	7	7	7
Cultural Operations	32	33	20	40
Harvest	79	78	45	71
Store, Grade, Sell	203	273	61	162
TOTAL COSTS	$ 430	$ 545	$ 208	$ 392
CASH COSTS	(62%) $ 267	(65%) $ 355	(71%) $ 149	(56%) $ 222

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[1] A Grower's Guide to Vegetable Production Costs, 1968. Economics Division.

Table 18 RATES IN DOLLARS PER CAR ON FRESH FRUITS AND VEGETABLES

From California and Arizona - 1966[1]

TO: From Column	Calgary		Dawson Creek		Edmonton Edson Red Deer		Ref.
	A	B	A	B	A	B	
1 & 4	610	685	760	960	640	715	1
	650	725	830	1,030	680	755	2
	775	850	980	1,180	805	880	3
2	640	730	790	980	670	750	1
	680	770	860	1,050	710	790	2
	805	895	1,010	1,200	835	915	3
3	680	770	825	1,040	705	800	1
	720	810	895	1,110	745	840	2
	845	935	1,045	1,260	870	965	3
5	695	785	840	1,060	720	815	1
	735	825	910	1,130	760	855	2
	860	950	1,060	1,280	885	980	3
6	725	820	870	1,095	750	850	1
	765	860	940	1,165	790	890	2
	890	985	1,090	1,315	915	1,015	3

Reference 1. Rates apply on shipments loaded in refrigerator cars having an inside length of 34 feet, 6 inches or less with bulkheads in place.

2. Rates apply on shipments loaded in refrigerator cars having an inside length over 34 feet, 6 inches to and including 39 feet, 2 inches in length.

3. Rates apply on shipments loaded in refrigerator cars having an inside length over 39 feet, 2 inches to and including 46 feet.

4. Items 1 to 6 reflect increased distances.

Column A: Rates apply on asparagus, cabbage, carrots, celery, corn, cucumbers, lettuce, melons (except cantaloupes and watermelons), tomatoes or citrus fruits, in straight or mixed carloads or in mixed carloads with dry onions or cantaloupes not to exceed 25% of the weight of shipment, or in mixed carloads with the following:

Anise
Artichokes
Beans
Beets
Butter Lettuce
Cauliflower
Endive
Escarole
Greens
Peas
Peppers
Radishes
Rutabagas
Spinach
Turnips
Vegetables, NOS, (except potatoes and onions)

Column B: Rates apply on cantaloupes in containers.

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[1] Northern Pacific and Pacific Southern Freight Bureau, U.S.A.

TABLE 19

RAIL FREIGHT RATES ON FRESH VEGETABLES

From: Lethbridge, Alberta[1]

To:	Rate /Cwt.	Min. Weight
Edmonton, Alberta	0.57	40,000 lbs.
Edmonton, Alberta	0.54	45,000 lbs.
Edmonton, Alberta	0.52	50,000 lbs.
Calgary, Alberta	0.41	40,000 lbs.
Saskatoon, Saskatchewan	0.86	40,000 lbs.
Regina, Saskatchewan	0.70	40,000 lbs.
Vancouver, B.C.	1.02	30,000 lbs.
Vancouver, B.C.	0.96	40,000 lbs.
Vancouver, B.C.	0.91	45,000 lbs.

---

[1] Rates include protection against heat and frost.
Tariff Ref: C.P.R. W 22C C.T.C. W 4288

- -

From: Edmonton, Alberta[2]

To:	Rate /Cwt.	Min. Weight
Calgary, Alberta	0.48	36,000 lbs.
Saskatoon, Saskatchewan	0.73	36,000 lbs.
Regina, Saskatchewan	0.90	36,000 lbs.
Vancouver, B.C.	1.30	36,000 lbs.
Winnipeg, Manitoba	1.30	36,000 lbs.

---

[2] Rates do not include charges for protection against heat and frost. Tariff Ref: C.P.R. W 22C C.T.C. W 4288 - 1966.
The above rates are class rates.

Table 19 Con't:

From: Vancouver, B.C.

To:		$
	Edmonton	1.03
	Calgary	1.00
	Winnipeg	1.90
	Saskatoon	1.48
	Regina	1.50

From: Kelowna, B.C.

To:	Regina	1.22
	Saskatoon	1.22
	Winnipeg	1.62
	Calgary	0.68 + .15 (ice) 0.83
	Edmonton	0.92 + .15 (ice) 1.07

From: Winnipeg, Manitoba

To:	Regina	0.66
	Saskatoon	0.78
	Calgary	1.17
	Edmonton	1.14

From: Moses Lake & Othello, Washington

To:	Calgary	1.14
	Edmonton	1.37
	Vancouver	0.45

From: Bakersfield, California

To:	Edmonton	2.10
	Calgary	1.90
	Vancouver	1.20

From: Idaho Falls, Idaho

To:	Calgary	1.40
	Edmonton	1.55
	Vancouver	1.00

From: Rainier

To:	Calgary	0.30

From: Countess

To:	Calgary	0.25

TABLE 20

COMMODITY FREIGHT RATES ON POTATOES
CANADIAN PACIFIC RAILWAY, CALGARY

As of September 1, 1966

All rates are for 40,000 pounds minimum unless otherwise stated:

From: Vauxhall, Alberta

To:	$	
Lethbridge	0.15	
Calgary	0.37	
Edmonton	0.52	
Edmonton	0.49	(45,000)
Edmonton	0.47	(50,000)
Peace River	1.02½	
Grande Prairie	1.02½	
Red Deer	0.47	
Kimberley	0.66	
Cranbrook	0.66	
Nelson	0.80	
Tadanak (Trail)	0.86	
Kamloops	0.86	
Vancouver	0.92½	(30,000)
Vancouver	0.87½	
Vancouver	0.82½	(45,000)
Victoria	0.99½	
Victoria	0.94½	(45,000)
Dawson Creek	1.02½	
Prince George	1.34	
Prince Rupert	1.60	
Swift Current	0.47	
Moose Jaw	0.59½	
Regina	0.63½	
Estevan	0.73	
Saskatoon	0.78½	
North Battleford	0.78½	
Prince Albert	0.83½	
Yorkton	0.85½	
Brandon	0.92½	
Dauphin	1.07	
Winnipeg	0.92½	
Kitchener	1.80	
Toronto	1.80	
Montreal	1.91	

Table 20 Con't:

From: Los Angeles, California[1]

To:	Rate /Cwt.	Min. Weight
Edmonton, Alberta	2.16	30,000 lbs.
Edmonton, Alberta	2.03	35,000 lbs.
Edmonton, Alberta	1.93	40,000 lbs.
Calgary, Alberta	2.06	30,000 lbs.
Calgary, Alberta	1.95	35,000 lbs.
Calgary, Alberta	1.86	40,000 lbs.
Regina, Saskatchewan	2.34	30,000 lbs.
Regina, Saskatchewan	2.23	35,000 lbs.
Regina, Saskatchewan	2.14	40,000 lbs.
Vancouver, B.C.	1.34	30,000 lbs.
Vancouver, B.C.	1.28	35,000 lbs.
Vancouver, B.C.	1.19	40,000 lbs.

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[1] Tariff Ref: P.S.C.F.B. 39-T, except Vancouver is P.S.C.F.B. 60-0

- - - - - - - - - - - - - - - - - - - -

From: Phoenix, Arizona[2]

To:	Rate /Cwt.	Min. Weight
Edmonton, Alberta	2.34	30,000 lbs.
Edmonton, Alberta	2.21	35,000 lbs.
Edmonton, Alberta	2.11	40,000 lbs.
Calgary, Alberta	2.24	30,000 lbs.
Calgary, Alberta	2.13	35,000 lbs.
Calgary, Alberta	2.04	40,000 lbs.
Saskatoon, Saskatchewan	2.60	30,000 lbs.
Saskatoon, Saskatchewan	2.49	35,000 lbs.
Saskatoon, Saskatchewan	2.40	40,000 lbs.
Regina, Saskatchewan	2.52	30,000 lbs.
Regina, Saskatchewan	2.41	35,000 lbs.
Regina, Saskatchewan	2.32	40,000 lbs.
Vancouver, B.C.	1.57	30,000 lbs.
Vancouver, B.C.	1.46	35,000 lbs.
Vancouver, B.C.	1.37	40,000 lbs.

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[2] Tariff Ref: P.S.C.F.B. 39-T, except Vancouver is P.S.C.F.B. 60-0

Table 20 Con't:

From: Vancouver, B.C.[1]

To:	Rate /Cwt.	Min. Weight
Edmonton, Alberta	1.57	24,000 lbs.
Calgary, Alberta	1.49	24,000 lbs.
Saskatoon, Saskatchewan	1.85	24,000 lbs.
Lethbridge, Alberta	1.57	24,000 lbs.
Regina, Saskatchewan	1.93	24,000 lbs.

---

[1] Rates include protection against heat and frost.
Tariff Ref: C.P.R. W 22 C C.T.C. W 4288

- -

From: Toronto, Ontario

To:	Rate /Cwt.	Min. Weight
Edmonton, Alberta	2.54[2]	36,000 lbs.
Calgary, Alberta	2.59[2]	36,000 lbs.
Saskatoon, Saskatchewan	2.16[2]	36,000 lbs.
Regina, Saskatchewan	2.04[2]	36,000 lbs.
Vancouver, B.C.	2.78[3]	50,000 lbs.
Vancouver, B.C.	2.67[3]	60,000 lbs.
Vancouver, B.C.	2.64[3]	70,000 lbs.

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[2] Tariff Ref: C.F.A. 5-J C.T.C. 1515

[3] Tariff Ref: C.F.A. 1-T C.T.C. 1734

- -

From: California

To:	Rate /Cwt.	Min. Weight
Toronto	1.85	36,000 lbs.
Detroit	1.57	50,000 lbs.

Table 20 Con't:

From: Peace River, Alberta[1]

To:	Rate /Cwt.	Min. Weight
Edmonton, Alberta	0.73	36,000 lbs.
Calgary, Alberta	0.99	36,000 lbs.
Saskatoon, Saskatchewan	1.16	36,000 lbs.
Regina, Saskatchewan	1.39	36,000 lbs.
Vancouver, B.C.	1.83[2]	24,000 lbs.
Vancouver, B.C.	1.58[3]	36,000 lbs.
Winnipeg, Manitoba	2.03[2]	24,000 lbs.
Winnipeg, Manitoba	1.61[3]	36,000 lbs.

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[1] Rates do not include charges for protection against heat and frost. Tariff Ref: N.A.R. 120 C.T.C. 215.

[2] Class 30 C.P.R. W 1000 C.T.C. W 4204

[3] Rates are project mileage rates, 26% of Class 100 rates as per Board order.

- -

From: Winnipeg, Manitoba[4]

To:	Rate /Cwt.	Min. Weight
Edmonton, Alberta	1.12[5]	40,000 lbs.
Calgary, Alberta	1.13[5]	40,000 lbs.
Vancouver, B.C.	1.87[5]	40,000 lbs.
Saskatoon, Saskatchewan	0.94[6]	24,000 lbs.
Saskatoon, Saskatchewan	0.89[6]	30,000 lbs.
Lethbridge, Alberta	1.79[7]	24,000 lbs.
Lethbridge, Alberta	1.09[6]	40,000 lbs.

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[4] Tariff Ref: C.P.R. W 22C C.T.C. W 4288

[5] Rate includes protection against frost.

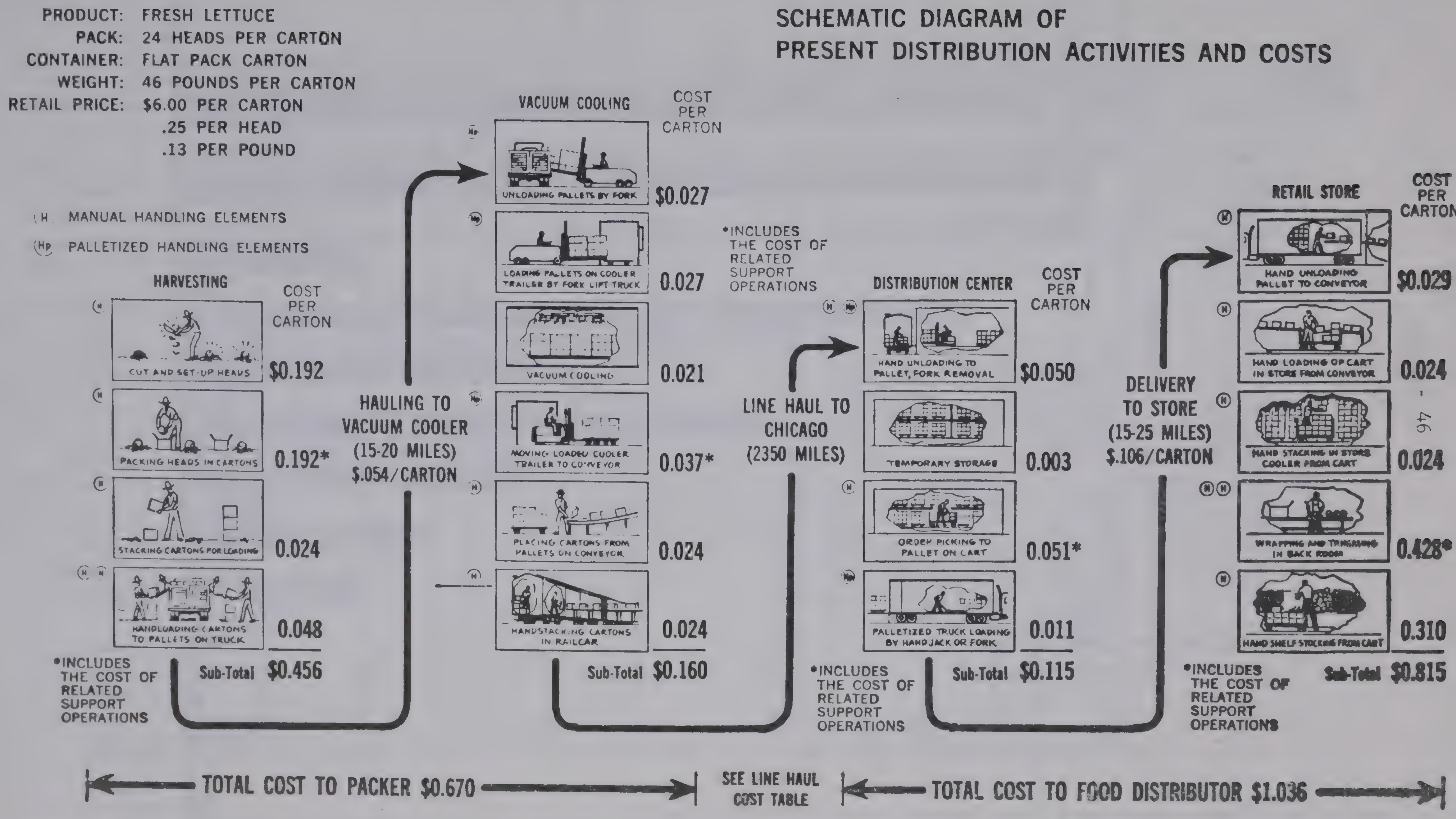
[6] Rate includes protection against heat and frost.

[7] Rate does not include protection against heat and frost.

Figure 15

FLOW CHART OF HANDLING COSTS FOR LETTUCE
HARVEST TO RETAIL SHELF - CALIFORNIA [1/]

SCHEMATIC DIAGRAM OF
PRESENT DISTRIBUTION ACTIVITIES AND COSTS


PRODUCT: FRESH LETTUCE
PACK: 24 HEADS PER CARTON
CONTAINER: FLAT PACK CARTON
WEIGHT: 46 POUNDS PER CARTON
RETAIL PRICE: $6.00 PER CARTON
.25 PER HEAD
.13 PER POUND
H MANUAL HANDLING ELEMENTS
Hp PALLETIZED HANDLING ELEMENTS
HARVESTING
COST PER CARTON
CUT AND SET-UP HEADS
$0.192
PACKING HEADS IN CARTONS
0.192*
STACKING CARTONS FOR LOADING
0.024
HANDLOADING CARTONS TO PALLETS ON TRUCK
0.048
Sub-Total $0.456
*INCLUDES THE COST OF RELATED SUPPORT OPERATIONS
HAULING TO VACUUM COOLER (15-20 MILES) $.054/CARTON
VACUUM COOLING
COST PER CARTON
UNLOADING PALLETS BY FORK
$0.027
LOADING PALLETS ON COOLER TRAILER BY FORK LIFT TRUCK
0.027
VACUUM COOLING
0.021
MOVING LOADED COOLER TRAILER TO CONVEYOR
0.037*
PLACING CARTONS FROM PALLETS ON CONVEYOR
0.024
HANDSTACKING CARTONS IN RAILCAR
0.024
Sub-Total $0.160
*INCLUDES THE COST OF RELATED SUPPORT OPERATIONS
LINE HAUL TO CHICAGO (2350 MILES)
DISTRIBUTION CENTER
COST PER CARTON
HAND UNLOADING TO PALLET, FORK REMOVAL
$0.050
TEMPORARY STORAGE
0.003
ORDER PICKING TO PALLET ON CART
0.051*
PALLETIZED TRUCK LOADING BY HANDJACK OR FORK
0.011
Sub-Total $0.115
*INCLUDES THE COST OF RELATED SUPPORT OPERATIONS
DELIVERY TO STORE (15-25 MILES) $.106/CARTON
RETAIL STORE
COST PER CARTON.
HAND UNLOADING PALLET TO CONVEYOR
$0.029
HAND LOADING OF CART IN STORE FROM CONVEYOR
0.024
HAND STACKING IN STORE COOLER FROM CART
0.024
WRAPPING AND TRIMMING IN BACK ROOM
0.428*
HAND SHELF STOCKING FROM CART
0.310
Sub-Total $0.815
*INCLUDES THE COST OF RELATED SUPPORT OPERATIONS
TOTAL COST TO PACKER $0.670
SEE LINE HAUL COST TABLE
TOTAL COST TO FOOD DISTRIBUTOR $1.036

[1/] "The Packer", November, 1966.

Table 21

TRANSPORTATION COSTS FOR LETTUCE

California to Chicago

COST SUMMARY

Type of Transportation Equipment	Total Cost Per Carton	Direct Distribution Costs Only[1]	Direct Distribution Cost as Per Cent Of ($6.00) Retail
Ice Bunker Car	$2.834	$2.251	37.5%
Standard Mechanical Car	2.764	2.181	36.4
Giant Mechanical Car	2.644	2.061	34.4
Super Giant Mechanical Car	2.536	1.953	32.6
Piggyback	2.483	1.900	31.7

[1] Excluding cutting and set up in field, vacuum cooling, trimming and wrapping costs since these are not distribution costs.

- -

LINE HAUL TRANSPORTATION TO CHICAGO

Type of Transportation	% of 1965 Chicago Receipts	Cartons Per Vehicle	Rate/Cwt. Including Refrigeration	Transportation Costs/ Carton
Rail - Type of Car	55.3%			
Ice Bunker		680	$2.452	$1.128
Standard Mechanical		756	2.293	1.038
Giant Mechanical		888	2.039	0.938
Super Giant Mechanical		1,137	1.805	0.839
Piggyback Car (2 trailers)	33.0	1,608	1.690[2]	0.777
Truck	11.7	804	[3]	[3]

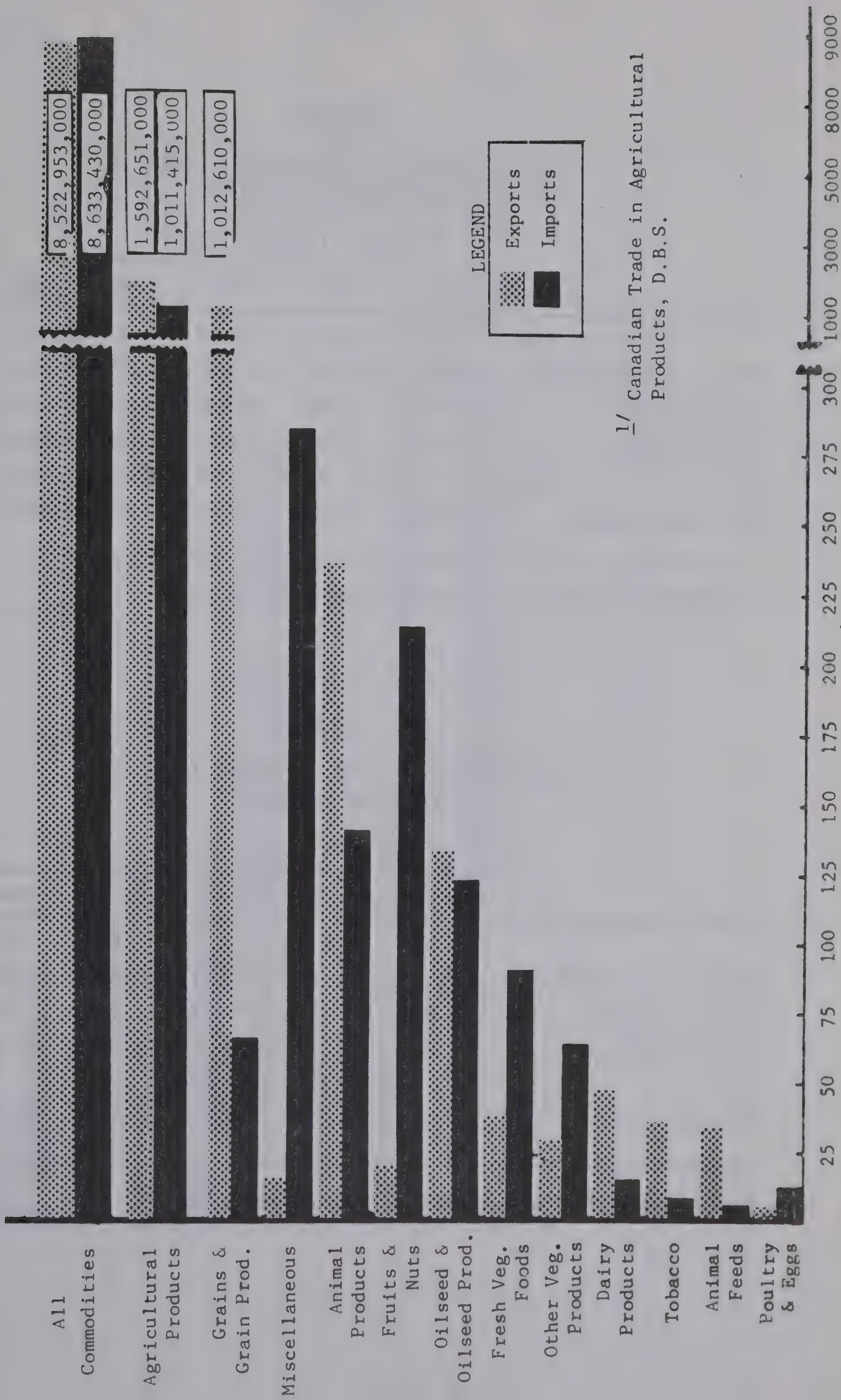
[2] Based on a per cent rate of $1,250 per carload.

[3] Rates subject to negotiation.

Figure 16

CANADIAN EXPORTS AND IMPORTS - 1965

ALL COMMODITIES AND AGRICULTURAL PRODUCTS[1/]



[1/] Canadian Trade in Agricultural Products, D.B.S.

TABLE 22

CANADIAN EXPORTS OF VEGETABLE FOODS[1/]

(INCLUDING POTATOES)

(,000's Dollars)

	1960	1961	1962	1963	1964	1965
	$	$	$	$	$	$
TOTAL - ALL COUNTRIES	16,073	15,560	21.676	26,019	30,251	37,881
United Kingdom	4,755	2,648	4,579	8,913	7,163	8,900
United States	5,864	6,491	6,231	6,268	10,000	13,938
E.E.C.	-	18	1,192	1,201	111	-
Other Countries	5,454	6,403	9,674	9,637	12,977	15,043

[1/] Canadian Trade in Agricultural Products - D.B.S.

TABLE 23

CANADIAN IMPORTS OF VEGETABLE FOODS[2/]

(INCLUDING POTATOES)

(,000's Dollars)

	1960	1961	1962	1963	1964	1965
	$	$	$	$	$	$
TOTAL - ALL COUNTRIES	68,423	66,287	71,965	72,541	79,983	90,757
United Kingdom	160	229	193	276	540	483
United States	58,544	62,736	61,962	60,615	66,106	72,995
E.E.C.	-	-	-	-	-	-
Other Countries	9,719	3,322	9,810	11,650	13,337	17,279

[2/] Canadian Trade in Agricultural Products - D.B.S.

TABLE 24

COMMUNICATION SERVICES AVAILABLE IN SELECTED ALBERTA CENTERS[1]

Town	Service
Bow Island	The following communication services are available in all of the selected centers: (a) Alberta Government Telephones (b) Canadian Pacific Telegraph (c) Federal Post Office
Brooks	
Coaldale	
Magrath	
Medicine Hat	
Raymond	
Redcliff	
Taber	
Vauxhall	

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[1] Alberta Bureau of Statistics.

TABLE 25

AVAILABILITY OF NATURAL GAS FOR SELECTED ALBERTA CENTERS[1/]

TOWN	SUPPLIER	RATE SCHEDULE
Bow Island	Canadian Western Natural Gas Company Limited	Town purchases gas in bulk from Canadian Western, but owns the distribution system. Therefore the rates may be negotiated with the town.
Brooks	Canadian Western Natural Gas Company Limited	Rate is determined by the estimated annual consumption of the plant. Available under a one-year contract.
Coaldale	Canadian Western Natural Gas Company Limited	Same as Brooks.
Magrath	Canadian Western Natural Gas Company Limited	Rate is determined by the estimated annual consumption of the plant. Available under a one year contract. Off peak or interruptable service agreement is available for plant operating on a seasonal basis.
Medicine Hat	System owned and operated by the City of Medicine Hat	Consumption of 6,000,000 cubic feet per year is the minimum limit of the general industrial rate. Special contract rates availble for large industrial users.
Raymond	Canadian Western Natural Gas Company Limited	Same as Magrath.
Redcliff	Canadian Power and Fuel Limited	Special rates can be secured from the Company for industrial plants.
Taber	Canadian Western Natural Gas Company Limited	Same as Brooks.
Vauxhall	Canadian Western Natural Gas Company Limited.	Same as Magrath.

[1/] Alberta Bureau of Statistics.

TABLE 26

AVAILABILITY OF ELECTRIC POWER FOR SELECTED ALBERTA CENTERS [1]

Town	Supplier	Rate Schedule
Bow Island	Calgary Power Limited, Power - three phase, 60 cycle.	1
Brooks	Calgary Power Limited, Power - three phase, 60 cycle.	2
Coaldale	Calgary Power Limited, Power - three phase, 60 cycle.	1
Magrath	Calgary Power Limited, Power - three phase, 60 cycle.	1
Taber	Calgary Power Limited, Power - three phase, 60 cycle.	2
Vauxhall	Calgary Power Limited, Power - three phase, 60 cycle.	1
Medicine Hat	Supplied by the City of Medicine Hat Power Company inter-connected with the Calgary Power System.	3

Rate Schedule:

	Demand Charge Per KW	KWH/KW/Mo. @ 5¢ per KWH	KWH/KW/Mo. @ 3¢ per KWH	Maximum KWH/Mo. @ 3¢/KWH	Excess KWH @
1	$1.00	40	100	1000	1 ¼¢
2	$1.00	40	70	700	1 ¼¢
3	$1.00	30 @ 6¢/KWH	-	-	1 ½¢

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[1] Alberta Power Commission

TABLE 27

AVAILABILITY OF WATER FOR SELECTED ALBERTA CENTERS

Town	Source	Date	Capacity	Rate
Bow Island	St. Mary-Milk River Irrigation Development project	1965	Water is pumped into two reservoirs (18 mil. gal. capacity), then through a filtering plant. The treated water is pumped, as required, into a 40,000 gallon elevated tower.	first 3000 gal. or less = $3.25 per month next 4000 gallons = $0.45 per 1000 gal. excess gallons = $0.40 per 1000 gal.
Brooks	Eastern Irrigation District	1964	Water pumped into reservoirs (110,487,663 gal. capacity), then to an elevated tower of 41,700 gallon capacity.	first 1000 cubic feet = $2.00 bi-monthly excess cubic feet used bi-monthly = $0.20 per 1000 cu. ft. (subject to negotiation with town council).
Coaldale	St. Mary-Milk River Dam	1964	Water pumped into reservoirs (37,580,000 gal. capacity), then filtered and pumped into a 75,000 gal. elevated tower when needed.	first 3000 gal. or less per mo. = $3.00 excess of 3000 gal./mo. = $0.60 per 1000 gal.
Magrath	Calgary Power Ltd. from 2 wells	1964	Pumped into 50,000 gal. reservoir then to 10,000 gal. hydropneumatic tank which feeds the mains.	Varies with the size of pipe through which water is to be purchased.
Medicine Hat	South Saskatchewan River	1966	Water pumped through a filtration plant into 3 reservoirs with total storage capacity of 3,750,000 gal., then to a 330,000 gal. tower.	Same as Vauxhall.
Raymond	Irrigation Canal	1964	Water is pumped into a 250,000 reservoir.	Commercial Service (not metered) = $50.00 per year.

Table 27 Con't: Availability of Water[1]

Town	Source	Date	Capacity	Rate
Redcliff	South Saskatchewan River	1964	Water pumped into a 278,000 gallon elevated tower.	Industrial rate = $0.25 per 1000 gal.
Taber	(a) Oldman River	1964	Water pumped into a 1,100,000 gallon reservoir then to an 84,000 gallon elevated tower.	First 240 cu. ft. or less per mo. = $2.00 Next 760 cu. ft./mo. = $0.25 per 100 cu. ft. Next 10,000 to 15,000 cu. ft./mo. = $0.19/100 cu.ft. Next 20,000 cu. ft./mo. = $0.18/100 cu. ft. Balance cu. ft. per mo. = $0.17/100 cu. ft.
	(b) Taber Irrigation District Dam		Water fed into large open type reservoir f 68,000,000 gal., then pumped to elevated 104,000 gal. storage tank.	
Vauxhall	Irrigation Reservoir		Water pumped into 9,000,000 gal. reservoir filtered, then pumped into a 100,000 gal. storage tank.	Rates vary widely, depending on consumption patterns and the size of the pipe supplying the plant.

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[1] Water Resources, Alberta Department of Agriculture.

TABLE 28A

SUMMARY OF YIELD, VALUES AND COSTS PER ACRE - IRRIGATION[1/]

Vegetable	Net Yield	Wholesale Unit	Value	Cash Cost	Non-Cash Cost	Total Cost	Approx. Margin
	lbs.		$	$	$	$	$
Asparagus	2,400	30 lb.	456	303	61	364	92
Beets	16,000	50 lb.	400	255	92	347	53
Cabbage	16,000	20 lb.	480	291	52	343	137
Carrots (Bulk)	20,000	50 lb.	800	384	299	683	117
Carrots (Poly)	20,000	1#.2#.3#	1,200	477	383	860	340
Cauliflower	10,000	50 lb.	650	436	43	479	171
Celery	24,000	60 lb.	1,560	1,137	44	1,181	379
Sweet Corn	7,000	5 doz.	245	158	29	187	58
Cucumbers	10,000	50 lb.	900	695	47	742	158
Lettuce	16,000	40 lb.	800	514	40	554	246
Onions (Dry)	20,000	50 lb.	800	355	157	512	288
Parsnips (Bulk)	12,000	50 lb.	720	339	265	604	116
Parsnips (Poly)	12,000	1#,50#	1,080	460	285	745	339
Potatoes	16,000	100 lb.	360	225	72	297	63
Tomatoes	12,000	30 lb.	960	1,001	138	1,139	-179
Turnips(Rutabagas)	18,000	50 lb.	630	328	243	571	59

[1/] Appendix, Schedules 1 to 4.

TABLE 28B

SUMMARY OF YIELD, VALUES AND COSTS PER ACRE - DRYLAND[1]

Vegetable	Net Yield	Wholesale Unit	Value	Cash Cost	Non-Cash Cost	Total Cost	Approx. Margin
	lbs.		$	$	$	$	$
Asparagus	2,000	30 lb.	380	254	48	302	78
Beets	12,000	20 lb.	300	195	67	262	38
Cabbage	12,000	50 lb.	360	221	40	261	99
Carrots (Bulk)	12,000	50 lb.	480	265	206	471	9
Carrots (Poly)	12,000	1#,2#,3#	720	371	227	598	122
Cauliflower	8,000	30 lb.	520	376	31	407	113
Cucumbers	6,000	50 lb.	360	317	23	340	20
Lettuce	10,000	40 lb.	500	344	29	373	127
Parsnips (Bulk)	10,000	50 lb.	600	267	163	430	170
Parsnips (Poly)	10,000	1#,2#	900	355	190	545	355
Potatoes	10,000	100 lb.	225	149	59	208	17
Turnips (Rutabagas)		50 lb.	420	222	170	392	28

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[1] Appendix, Schedules 5 to 7.

Schedule 8

COSTS AND RETURNS OUTSIDE OF ALBERTA
FOR 12 FRESH VEGETABLES

Vegetable		Location	Date	Farm Price	Yield/ Acre	Cost/ Acre	Cost/ Cwt.
				$/Cwt.	Lbs.	$	$
Asparagus	-(St)- (Fresh)	Ontario	1964	19.40	2,029	354	17.50
	(Fresh)	Coachella	1962	23.73	3,000	655	21.86
	(F. & P.)	San Joaquin. Cal.	1963	14.46	3,000	448	14.96
	(F. & P.)	San Joaquin. Cal.	1965	15.90	3,000	564	18.81
Cabbage	(Fresh)	Riverside. Cal.	1959	2.25	18,000	316	1.75
	-(St)- (Fresh)	Everglades. Fla.	1961	1.97	19,000	370	2.19
	-(St)- (Fresh)	New York	1961	2.50	30,000	742	2.38
	(Fresh)	Ventura County, Cal.	1965	3.00	36,000	1,030	2.86
Cauliflower	(Fresh)	Orange County, Cal.	1964	7.26	10,000	513	5.13
	(Proc.)	Santa Barbara, Cal.	1964	7.38	7,000	422	6.00
	(Fresh)	New York	1963	7.64	10,000	888	8.88
Celery	(Fresh)	Santa Barbara, Cal.	1965	3.32	58,000	1,953	3.37
	(Fresh)	Orange County, Cal.	1964	3.32	65,000	2,377	3.65
	(Fresh)	New York	1961	4.00	30,000	1,449	4.50
Carrots	-(St)- (Fresh)	Southern Alberta	1962-64	4.40	20,500	702	3.43
	(Fresh)	Riverside, Cal.	1962	4.93	24,000	1,205	4.82
	(Fresh)	Riverside, Cal.	1959	4.30	30,000	1,003	3.34
	-(St)- (Proc.)	New York	1960	2.32	38,000	294	0.73
	-(D)- (Fresh)	Manitoba	1960	2.20	30,000	494	1.64

Schedule 8 (con't) CONDENSATION OF COMPARATIVE COSTS AND RETURNS

Vegetable		Location	Date	Farm Price	Yield/ Acre	Cost/ Acre	Cost/ Cwt.
				$/Cwt.	Lbs.	$	$
Cucumbers	(Proc.)	Santa Clara, Cal.	1963	3.00	20,000	727	3.63
	(Fresh)	Tulare County, Cal.	1964	-	16,000	1,806	11.30
	(Proc.)	San Joaquin, Cal.	1963	2.75	28,000	734	2.62
	(Fresh)	Florida	1960	7.33	14,000	780	5.57
	(Fresh)	New York	1961	5.04	19,000	933	4.91
Sweet Corn -(St)-	(Fresh)	Alberta	1962-64	2.73	6,700	119	1.78
	(Fresh)	Kern County, Cal.	1964	4.90	10,000	517	5.16
	(Fresh)	Coachella, Cal.	1962	4.30	10,000	392	3.92
	(Fresh)	Contra Costa, Cal.	1964	4.90	12,500	602	4.82
Lettuce	(Fresh)	Monterey County, Cal.	1964	3.92	16,000	634	3.93
	(Fresh)	Contra Costa, Cal.	1964	3.92	16,000	733	4.58
	(Fresh)	Riverside, Cal.	1959	4.22	20,000	543	2.71
	(Fresh)	Monterey County, Cal.	1961	3.75	16,000	651	4.06
	(Fresh)	Riverside, Cal.	1962	4.13	16,000	635	3.95
	(Fresh)	Santa Barbara, Cal.	1965	3.92	18,000	737	4.09
	(Fresh)	Stanislaus, Cal.	1964	3.92	13,000	500	3.83
	(Fresh)	Everglades, Fla.	1960	2.91	16,000	452	2.82
	(Fresh)	Ventura County, Cal.	1962	4.13	18,000	700	3.88
-(St)-	(Fresh)	Ontario	1964	4.02	28,000	921	3.29

Schedule 8 (con't) CONDENSATION OF COMPARATIVE COSTS AND RETURNS

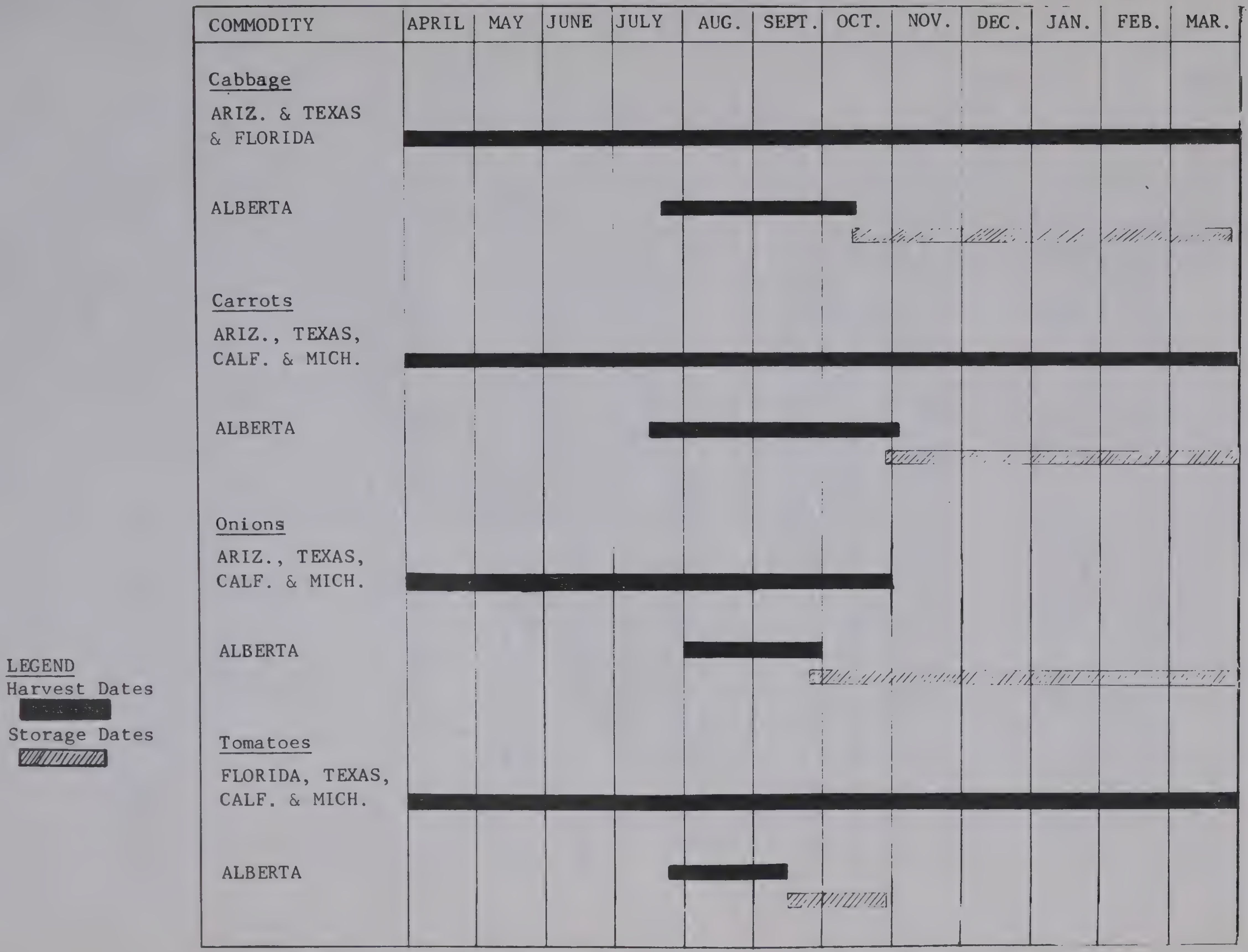
Vegetable		Location	Date	Farm Price	Yield/ Acre	Cost/ Acre	Cost/ Cwt.
				$/Cwt.	Lbs.	$	$
Onions	(Dry)	San Joaquin, Cal.	1965	2.39	35,000	916	2.61
	(Proc.)	Tulelake, Cal.	1964	2.06	30,000	410	1.37
	(Dry)	Riverside, Cal.	1962	2.00	30,000	767	2.56
	(Dry)	West River, Cal.	1962	2.00	50,000	1,059	2.12
	(Dry)	San Berdoo, Cal.	1961	2.31	35,000	1,017	2.54
	-(D)- (Dry)	New York	1961	3.36	35,000	729	2.08
	-(D)- (Dry)	Manitoba	1960	3.10	16,000	511	3.19
	(Dry)	Alberta	1962-64	4.10	15,300	418	2.74
Potatoes	(Fresh)	W. Riverside, Cal.	1962	2.47	20,000	550	2.75
	(Fresh)	Santa Barbara, Cal.	1964	4.13	25,000	657	2.62
	(Fresh)	Tulelake, Cal.	1964	4.13	20,000	510	2.55
	-(St)- (Fresh)	Hastings, Cal.	1960	2.27	20,000	439	2.19
	(Fresh)	Tulelake, Cal.	1962	2.05	20,000	474	2.37
	-(D)- (Fresh)*	Edmonton, Alberta	1962	1.80	12,000	132	1.10
	-(St)- (F. & P.)*	Southern Alberta	1962	1.80	18,000	169	0.94
	-(D)- (Fresh)	Manitoba	1960	1.60	15,000	216	1.44
Tomatoes	(Stake)	Florida	1960	7.43	13,000	876	6.73
	(Proc.)	San Joaquin, Cal.	1962	2.76	40,000	519	1.29
	(Stake)	Toulare, Cal.	1964	8.50	40,000	3,754	9.38

Schedule 8 (con't) CONDENSATION OF COMPARATIVE COSTS AND RETURNS

Vegetable		Location	Date	Farm Price	Yield/ Acre	Cost/ Acre	Cost/ Cwt.
				$/Cwt.	Lbs.	$	$
Tomatoes Con't.	(Proc.)	Sacramento, Cal.	1964	1.50	40,000	542	1.35
	(Proc.)	Ontario	1962	1.84	34,400	440	1.27
	(Stake)	Coachella, Cal.	1959	7.90	30,000	2,327	7.76
	(Stake)	San Diego, Cal.	1961	7.60	40,000	3,512	8.78
	(Proc.)	W. Riverside. Cal.	1959	2.21	36,000	440	1.22
Turnips -(St)- (Rutabagas)	(Fresh)	Southern Alberta	1962-64	3.40	17,600	485	2.75

* - Approximate averages.
(St) - Formal study, costs and returns.
(D) - Dryland.

Figure 17: COMPARATIVE SEASONALITY OF U.S.A. TO ALBERTA VEGETABLE CROPS[1]



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[1] Source: U.S.D.A. Agriculture Handbook No. 80, December 1954.

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